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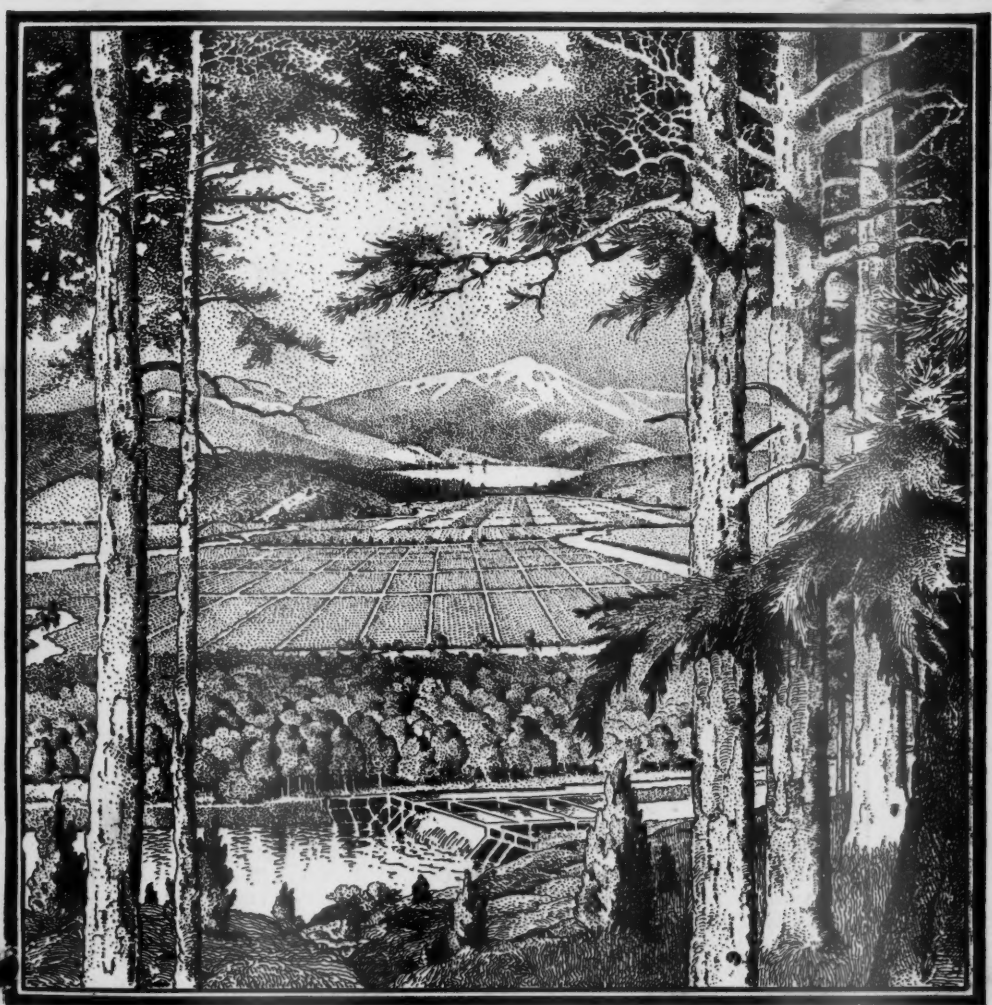

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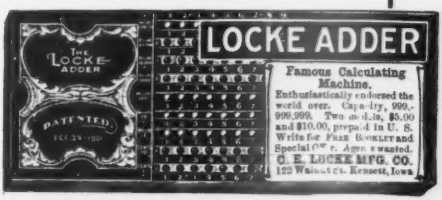
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Forestry and Irrigation

H. M. SUTER, Editor

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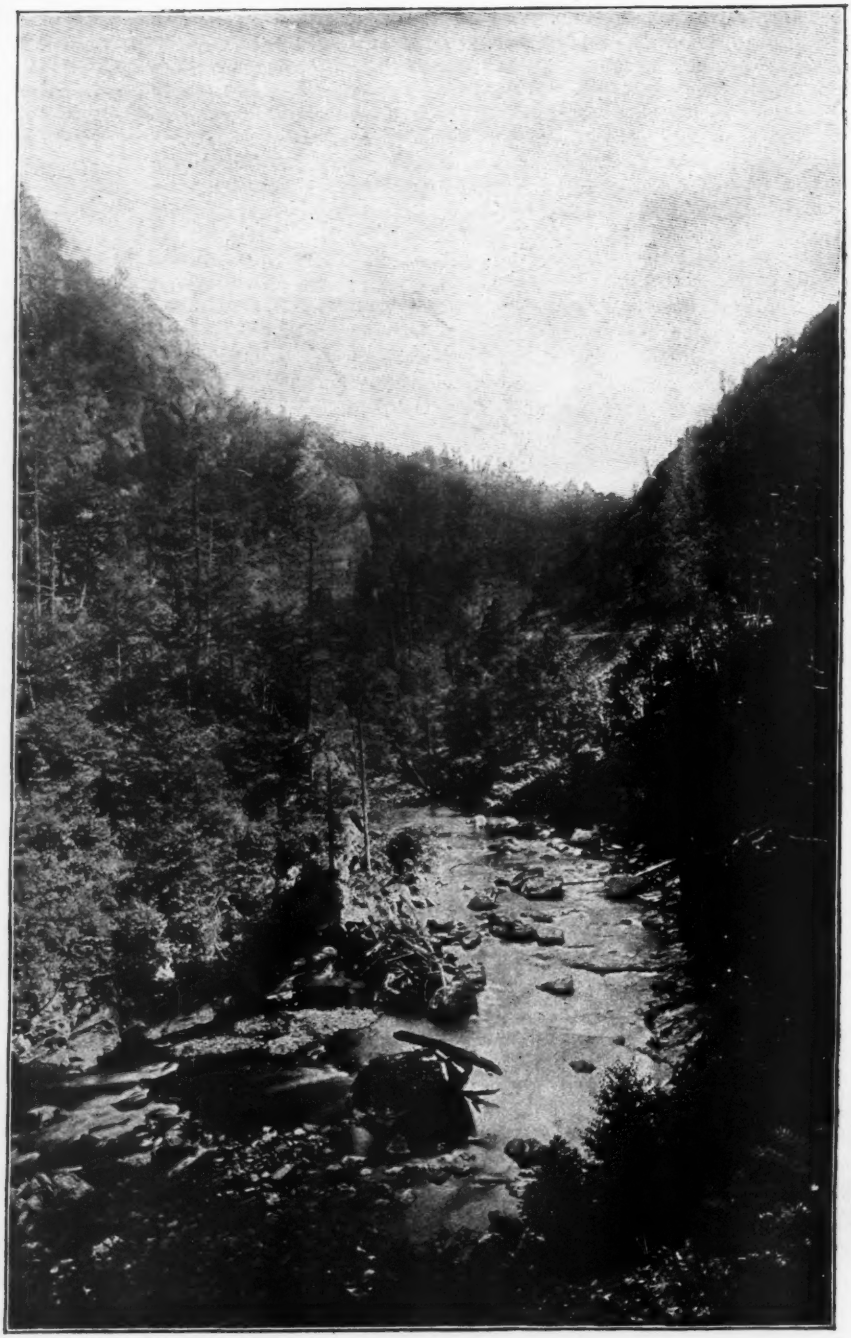

Doe River Gorge, Tennessee. The Forests on the steep slopes of this beautiful gorge are being rapidly destroyed by the fire and the axe.

VOL. XII. JULY, 1906. NO. 7

NEWS AND NOTES

New Forestry Association

Of the Northern New York Forestry Association recently organized the *Paper Mill* has the following to say:

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"That the efforts of the new organization will be intelligently directed and will result in much good for the important object involved is apparent at a glance. The men interested are among the leaders in the section's activities, and they will see to it that everything possible is done to help the people toward the right point of view in this matter.

"The plan of campaign is not fully mapped out as yet, but it is understood that one portion of the plan in consideration is to disseminate literature compiling from the highest sources facts and figures to prove that the European system of forest culture, which permits the securing of no inconsiderable revenue through the judicious cutting of ripened timber, is better than the present 'let-alone' policy which doesn't do the State or anybody any good. The idea of allowing the forest to wallow in its own decay, without the right to take a single stick of timber therefrom, is an antiquated one, a fact which is better realized in Northern New York than in some other sections of the Empire State.

"It must not be assumed, however, that the newly formed association for one moment stands for the wholesale destruction of the forest. Its members are not so foolish. Time was, a generation or so ago, when members of the trade as well as lumbermen, grown reckless through the accustomed sight of much profusion, were wasteful in their methods, though the brunt of these practices must be laid far more at the doors of lumbermen than of the trade. Certain operators were accustomed, after the first and second cuttings, which weeded out about everything worth while, to burn the denuded tracts over and leave of them only blackened wastes. There has not been the semblance of these practices among the trade in many

years, though certain lumbermen are still sinners in this regard.

"Now this new association, to which belong many members of the trade and many enlightened lumbermen, intends to war upon these practices just as much as it does upon the foolish 'let-alone' policy. What the members of this organization desire is to institute in Northern New York a system of forest preservation and culture in line with common sensee. In searching for such a system their eyes fall naturally upon the forests, splendid assets under governmental protection, as in Austria and Germany. The association, too, is in strict sympathy with the efforts along lines that are being made by the Government.

"The trade's attitude in the matter of timber cutting has for years been along the line of retrenchment and the conservation and replanting of denuded wastes. The act of the Remington-Martin Company, of Norfolk and Watertown, in buying a great tract upon which forest culture is to proceed annually, years to pass before any cutting is done, is a fair sample of how the mill owneers of this section feel about it.

The Northern New York Forestry Association, whose principal office is at Watertown, was incorporated June 29, to spread sound information in relation to the protection of the forests and the cultivation of forests on waste lands throughout Northern New York. The directors are: O. B. Tappan, of Potsdam; G. H. P. Gould, of Lyon Falls; W. B. Van Allen and W. O. Ball, of Carthage; D. C. Middleton, Joseph Atwell, W. W. Conde and Elon R. Brown, of Watertown; C. O. Roberts, of Philadelphia; T. B. Basselin, of Croghan; Thomas Spratt, of Ogdensburg, and L. P. Hale, of Canton.

Forests and Paper Supplies

That many newspaper proprietors are not alive to the danger that threatens them in the shape of a scant supply of paper or already exorbitant and increasing prices for that material was the substance of a statement made recently by Lord Northcliffe (Sir Alfred Harmsworth), who arrived on the Kaiser Wilhelm der Grosse, of of the North German line, as reported by the *Paper Trade*. Lord Northcliffe also said that through having acquired a large tract of forest land in Newfoundland he would be able to protect not only his own large interests but those of a dozen of the largest newspapers in the United States as well. He is the proprietor of 58 newspapers and periodicals.

He said: "Broadly speaking, I consider that newspaper owners, as a rule, have not sufficiently considered the great difficulties that lie ahead of them in securing their paper supplies.

"My eyes were opened to the situation at the time of the Boer War, when the price of paper rose universally. From that moment I made up my mind that my business should become independent of paper shortages, whether real or promoted by trusts, and I have been fortunate enough to secure from the Government of Newfoundland a vast concession of forest land, sufficient, I believe, to protect not only my own business, but a dozen other of the largest businesses in the United States, a concession which will, I believe, also bring added prosperity to that wonderful colony."

New York Forestry

The Forest, Fish and Game Commission's recent trip through the Adirondacks was most encouraging to Senator Jotham P. Allds and his associates, both as to the state of things in Adirondack Park and the progress made in scientific forestry on certain of the State tracts. Colonel Fox's policy of encouraging reforestation by transplanting young trees and by planting seed is proving more and more of a success as time goes on. The work accomplished by the State's experiments in the past five years has been remarkably successful.

The first plantation under the direction of the State was on Timothyberg Mountain, in the Catskills, in 1901.

Scotch and white pine and Norway spruce were planted in groves at the foot and top and in rows up the side of the mountain. At present these trees are four feet high. When set out they were but a foot high.

The next plantation was started in 1902, 250,000 trees being set out near Lake Clear Junction in the Adirondacks. The trees included considerable Norway spruce, Scotch pine, fir and larch. The average growth of these trees last year was eighteen inches, some growing fully two feet. In the same year 250,000 trees were set out along the railroad leading from Lake Clear to Saranac Lake.

Four miles from Paul Smith's is located the fourth plantation. Ninety-eight per cent. of the trees set out are growing rapidly. Last fall another plantation was made on the property of the State hospital at Raybrook and still another was established near Placid. The work of the forestry department this spring, under the supervision of Abraham Knechtel, has been confined to additions to the plantations made and in testing tree seeds. The forestry department reports that seeds

J. B. LIPPINCOTT

In whose resignation the United States Reclamation Service has lost the services of a splendid engineer.

planted last fall indicate by their development that this method of reforestation is a success.

The State owns three nurseries. One is at Saranac Inn Station, another as Wawbeek and the third at Axton.

There are several private plantations in the Adirondacks. One of these, at Northville, is owned by Jas. S. Cole and the Saranac Inn Association owns another. The Delaware and Hudson Company has an experimental nursey at Wolf Pond.

About the Cotton Tree

According to Mr. Herbert J. Webber, chief of the plant-breeding laboratory of the U. S. Department of Agriculture, cotton planters in the United States need have no fear that the tree discovered by J. R. Spence, of Deesee, India, is going to put them out of business. He says the new cotton tree recurs as often as Christmas, and with a proportionate amount of noise.

Speaking of this latest "discovery," Mr. Webber says: "So far as this country is concerned, the Spence tree is not worth 5 cents. In my opinion, the whole thing is a farce. Whatever value, if any, the tree may possess, will be a purely local one, and of absolutely no commercial value to people outside of India.

"Trees of that kind are always being discovered. The last was in Australia, and one was also recently found in India; neither of which, however, revolutionized the cotton-growing industry.

"For seven or eight years the department has been making experiments with cotton trees, and none of them has amounted to anything. The trees will not stand the severe climate in this country and always freeze. I have seen them grow as high as this room, but never have they put forth a single boll.

"We have tried hybrydizing these foreign trees with out native plants, thinking that in this way we might secure a plant that did not require so long a time to reach the blooming age, but all of the efforts have been unavailing.

"It takes two years to bring a cotton plant to the period when it will bear, and several more to make it a paying investment. Consequently, a tree from a tropical country stands no chance here. The only successful result that has attended our endeavors along this line of breeding is to have increased the length of the plant's staple.

"Our agent in India has secured some of the seed from this new tree of Spence's, and we shall make experiment with them. I am not at all optimistic of the outcome.

"These wonderful stories about the crops to be raised from these so-called new trees, are always based upon the growth of one or two trees, and are generally sent out in advance of some business scheme.

"It has been so time and again, and will probably continue so long as cotton is grown.

Change of Quarters

The removal of the principal offices of the Reclamation Service from the Hooe Building to the Munsey Building in Washington marks the termination of the period of infancy of the Reclamation Service and its separation from the parent body, the Geological Survey.

On the passage of the Reclamation Act on June 17, 1902, the Reclamation Service was organized by the Secretary of the Interior as a part of the Hydrographic Branch of the Geological Survey, as the work to be performed was a natural outgrowth of the investigations which had been carried on for many years by that bureau. The principal engineers connected with this work formed the nucleus of the new organization, and other men were obtained from time to time as needed, from the eligible list of the Civil Service Commission.

On the fourth anniversary of the formation of the Reclamation Service it has definitely broken away by moving into new quarters. During these

fours the organization has increased from less than a dozen men to over four hundred engineers and assistants, carrying on work throughout widely scattered localities in the arid West. Contracts have been let and work is under way involving the expenditure of upwards of $25,000,000, and other contracts are being prepared which will necessitate the expenditure in all of nearly $40,000,000. There are now working for the contractors nearly 10,000 men, and the Reclamation Service has working directly for it over 2,000 men, including day laborers and mechanics. The monthly expenditures aggregate about $1,000,000, having gradually increased until they are now practically at the maximum. It is not probable that there will be further expansion, but, on the contrary, a considerable consolidation and reduction of force as the larger works are completed.

The rapid growth of the Reclamation Service is indicated by the annual expenditures. For the fiscal year ending June 30, 1903, these were a little over half a million dollars; for 1904, one and one-half millions; for 1905, three and three-quarter millions; and for the year ending June 30, 1906, very nearly eight millions, the greater part of this amount being expended during the months of May and June, when the expenditures reached over a million dollars each.

Allotment of Funds

The Secretary of the Interior has adjusted the allotments of the reclamation fund in accordance with recent estimates from the General Land Office as to the probable amount of this fund during the next two years. The fundamental principle has been to allot the fund to the projects where the work is now furthest advanced and where returns to the fund may be expected in the near future.

The surveys and examinations already made show that at least $100,000,000 could be used to advantage in various parts of the arid West. The total fund which will be available from the proceeds of public lands for the years 1901-8 is estimated by the General Land Office to be a little over $41,000,000. In order, therefore, to continue the work, it is necessary that this money, or as much of it as possible, be invested in works which will begin to yield returns to the fund at the earliest possible date, so that the money may be used over again as soon as possible for the construction of other works.

In several of the projects a number of years must elapse before the works will be completed. Such projects will not be revenue producing for some years. On the other hand, in Nevada the work has advanced to a point where upwards of 50,000 acres are already under irrigation and revenue may bee expected soon from this area. Other projects are nearing completion and every possible effort is being made to finish these so that they may begin to repay the cost.

Reclamation Work in Oregon

Oregon leads in the Government work of reclamation, both in the amount of money contributed to the reclamation fund through the disposal of public lands in that State, and through the amount of money set aside for the construction of works within its borders.

It also leads in the difficulties encountered in getting the work started. Although the natural advantages of the State are great and appear attractive on first sight, yet it has required more time and energy to find feasible reclamation projects than elsewhere. This is due to a number of conditions, such as legal complications, the lack of transportation facilities, and the ownership of land in large bodies by cattle companies and syndicates who have acquired vast tracts under the Federal Land laws.

Immediately after the passage of Reclamation Act on June 17, 1902, investigations were begun throughout the State. Public meetings were held by interested citizens and a large number of schemes suggested. One after

another these were found to be impracticable from lack of dependable water supply, or were tied up in complications of vested rights to water, or entagled with large land grants. Disappointment followed most of the attempts, but finally out of the large number of projects examined the Secretary of the Interior was able to declare feasible the Klamath project in the southern part of the State on the border of California, and the Umatilla project in the northeastern part of the State.

For the Klamath project the Secretary of the Interior set aside the sum of $4,400,000, of which $2,000,000 are now available and are being used, the remainder, $2,400,000, to be used in the future.

For the Umatilla project $1,000,000 have been set aside and contracts are being let for the expenditure of that sum. This is the first unit of the proposed John Day project taking water from the river of that name and carrying it across the Blue Mountains to the fertile slopes south of Columbia River. This project will cost upwards of $10,000,000 and will require many years for completion. The first part, however, near Umatilla River can be carried out within a relatively short time.

Funds for Klamath Project

The Secretary of the Interior has transferred another million dollars to the reclamation fund for the Klamath project, making $2,000,000 now immediately available for construction. There has already been set aside the sum of $4,400,000 for this project, of which the above stated $2,000,000 is now being expended.

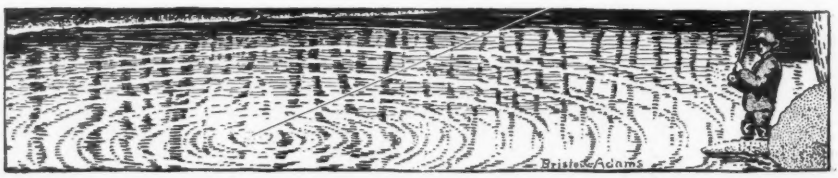
The greater part of this will be spent in Oregon, a small portion of irrigable land being across the line in the State of California. Work is being energetically pushed on the construction of the outlet tunnel from Klamath Lake. Two lines of railroad are being built from points in California to the irrigated region in the Klamath project.

Joy and Sorrow

There is some rejoicing and much sorrowing among the farmers under the first forty-five miles of the interstate canal, North Platt project. The cause of this paradoxical situation is that the month of June saw the completion of this section of the great ditch, the successful passage of water to the end of the constructed canal and its delivery for irrigation purposes, and that like the foolish virgins a large number of settlers were not ready for it.

On June 17th the water in the canal had reached a point at about the 41st mile, and on June 13th it had reached the end of the 45th mile. The Whalen Falls Canal Company is drawing at all their head-gates a maximum of about five cubic feet per second, with an average of probably not to exceed three cubic feet per second. There has been coming into the headgate a maximum of about 150 and a minimum of about 30 cubic feet per second.

Some 1,200 acres of land are in crop and have been irrigated from the canal; the balance of the 20,000 acres is not prepared to receive it. The lateral systems under the Whalen Falls Canal, and through which water is to be taken from the Government canal, are not built, with the exceeption of one at the 25th mile, which was opened about the middle of June.



FOREST SERVICE APPROPRIATION

Congress Gives One Million Dollars for Present Fiscal Year

THE rapid and substantial growth of the United States Forest Service is clearly set forth in that portion of the Agricultural Appropriation Bill for 1906-1907 which provides for its administration. One million dollars is the total amount appropriated, and is a striking testimonial to the administrative ability of the Forester, Mr. Gifford Pinchot, as well as to a keener appreciation by Congress of the importance of forestry to the nation. The text of the bill as relating to forestry is as follows:

Salaries, Forest Service: One Forester, who shall be chief of Bureau, three thousand five hundred dollars; two clerks class four, three thousand six hundred dollars; four clerks class three six thousand four hundred dollars; three clerks class two, four thousand two hundred dollars; five clerks class one, six thousand dollars; seven clerks at one thousand one hundred dollars each, seven thousand seven hundred dollars; nine clerks, at one thousand dollars each, nine thousand dollars; nine clerks, at nine hundred dollars each, eight thousand one hundred dollars; nineteen clerks, at eight hundred dollars each, fifteen thousand two hundred dollars; twenty clerks, at seven hundred dollars each, fourteen thousand dollars; thirteen clerks, at six hundred dollars each, seven thousand eight hundred dollars; one draftsman, one thousand eight hundred dollars; two draftsmen, at one thousand four hundred dollars each, two thousand eight hundred dollars; two draftsmen, at one thousand two hundred dollars each, two thousand four hundred dollars; four draftsmen, at one thousand dollars each, four thousand dollars; one artist, one thousand dollars; one photographer, one thousand four hundred dollars; one photographer, one thousand two hundred dollars; one photographer, one thousand dollars; two messengers, at seven hundred and twenty dollars each, one thousand four hundred and forty dollars; three messengers, at seven hundred dollars each, two thousand one hundred dollars; three messengers, at six hundred dollars each, one thousand eight hundred dollars; three messengers, at four hundred dollars each, one thousand two hundred dollars; one carpenter, one thousand dollars; one carpenter, seven hundred and twenty dollars; three watchmen, at seven hundred dollars each, two thousand one hundred dollars; one electrician, seven hundred dollars; one skilled laborer, seven hundred dollars; in all, one hundred and twelve thousand eight hundred and sixty dollars.

General Expenses, Forest Service: To enable the Secretary of Agriculture to experiment and to make and continue investigations and report on forestry, forest reserves, forest fires, and lumbering; to advise the owners of woodlands as to the proper care of the same; to investigate and test American timber and timber trees, and their uses, and methods for the preservative treatment of timber; to seek, through investigations and the planting of native and foreign species, suitable trees for the treeless regions; to erect necessary buildings: *Provided*, That the cost of any building erected shall not exceed one thousand dollars; for all expenses necessary to protect, administer, improve, and extend the national forest reserves, and officials of the forest service designated by the Secretary of Agriculture shall, in all ways that are practicable, aid in the enforcement of the laws of the States or Territories with regard to stock, for the prevention and extinguishment of forest fires, and for the protection of fish and game.

That the forest-reserve special fund provided for in section five of the Act approved February first, nineteen hun-

dred and five, entitled "An Act providing for the transfer of forest reserves from the Department of the Interior to the Department of Agriculture," shall continue until otherwise provided by law; but after June thirtieth, nineteen hundred and eight, it shall not be expended except in accordance with specific estimates of expenditures to be made from said fund for the succeeding fiscal year, to be submitted by the Secretary of Agriculture with the estimates of appropriation in the annual Book of Estimates.

That ten per centum of all money received from each forest reserve during any fiscal year, including the year ending June thirtieth, nineteen hundred and six, shall be paid at the end thereof by the Secretary of the Treasury to the State or Territory in which said reserve is situated, to be expended as the State or Territorial legislature may prescribe for the benefit of the public schools and public roads of the county or counties in which the forest reserve is situated: Provided, That when any forest reserve is in more than one State or Territory or county the distributive share to each from the proceeds of said reserve shall be proportional to its area therein: *And provided further,* That there shall not be paid to any State or Territory for any county an amount equal to more than forty per centum of the total income of such county from all other sources.

For ascertaining the natural conditions upon and for utilizing the national forest reserves; and the Secretary of Agriculture may, in his discretion, permit timber and other forest products cut or removed from the forest reserves of the United States, except the Black Hills Forest Reserve in South Dakota, to be exported from the State, Territory, or the district of Alaska, in which said reserves are respectively situated: *Provided,* That the exportation of dead and insect-infested timber only from said Black Hills Forest Reserve shall be allowed until such time as the Forester shall certify that the ravages of the destructive insects in said reserve are practically checked, but in no case after July first, nineteen hundred and eight; and hereafter sales of timber on forest reserves in the State of California shall in every respect conform to the law governing such sales in other States, as set forth in the Act of June sixth, nineteen hundred (Thirty-first Statutes at Large, page six hundred and sixty-one); and hereafter all moneys received as deposits to secure the purchase price on the sale of any products or the use of any land or resources of the forest reserves shall be covered into Treasury in the manner provided by section five of the Act of Congress approved February first, nineteen hundred and five, entitled "An Act providing for the transfer of forest reserves from the Department of the Interior to the Department of Agriculture," and the fund created by that Act shall be available, as the Secretary of Agriculture may direct, to make refunds to depositors of money heretofore or hereafter deposited by them in excess of amounts actually due to the United States; and hereafter all moneys received as contributions toward cooperative work in forest investigations shall be covered into the Treasury and shall constitute a special fund, which is hereby appropriated and made available until expended, as the Secretary of Agriculture may direct, for the payment of the expenses of said investigations by the Forest Service and for refunds to the contributors of amounts heretofore or hereafter paid in by them in excess of their share of the cost of said investigations, for the employment of fiscal and other agents, clerks, assistants, and other labor required in practical forestry, in the administration of forest reserves, and in conducting experiments and investigations in the city of Washington and elsewhere, and he may dispose of photographic prints (including bromide enlargements), lantern slides, transparencies, blue prints, and forest maps at cost and ten per centum additional, and condemned property or materials under his charge in the same manner as provided by law for other bureaus; for

collating, digesting, reporting, illustrating, and printing the results of such experiments and investigations; and for the purchase of all necessary supplies, apparatus, office fixtures, law books to an amount not exceeding five hundred dollars; for freight, express, telegraph, telephone charges, electric light and power, fuel, gas, ice, washing towels, and traveling and other necessary expenses, eight hundred and eighty-seven thousand one hundred and forty dollars of which sum not to exceed thirty-five thousand may be used for rent. And the employes of the Forest Service outside of the city of Washington may, in the discretion of the Secretary of Agriculture, without additional expense to the Government, be granted leave of absence not to exceed fifteen days in any one year, which leave may, in exceptional and meritorious cases which such an employe is ill, be extended, in the discretion of the Secretary of Agriculture, not to exceed fifteen days additional in any one year.

Total for Forest Service, one million dollars.

In the emergency appropriation for the Bureau of Animal Industry there was the following provision:

For Forest Service: For the erection of a wire fence and necessary sheds on the Wichita Forest and Game Preserve, to provide a range for a buffalo herd presented by the New York Zoological Society, and to provide for the maintenance of said herd, fifteen thousand dollars, of which sum not to exceed five hundred dollars shall be expended in buildings.

SIZE OF IRRIGATED FARMS

Amount of Land Needed in Northwest to Make it Profitable to Average Small Owner

BY

PROF. F. B. LINFIELD
Director Montana Experiment Station.

THE question has been asked: What area of land under the irrigation ditches constructed by the Reclamation Service should be considered as the farm unit? This question involves yet others. What is the purpose of the Government in undertaking this reclamation work? What class of people does it aim to help? I think all will agree that the man of large means and large capacity should not have first consideration, but rather the man of small means and capacity. The wage earners and laborers rather than the employer of labor. The aim of the Government should be to make it possible for the man of small means to build himself a home in a healthy atmosphere where the social and educational advantages are such as to develop the best type of citizenship.

Next, what area of land under irrigation will support a man and his family in comfort and also provide means for using educational opportunities for his family? The first part of this question can be answered only by asking another. What is the average yearly income of the average working man? While wages are good in Montana, probably $500 to $600 per year will be an outside wage obtained by the average laborer in the country towns. From this, house rent and all living expenses have to be paid. Now what will 40 acres of irrigated land return under careful, thorough and intelligent management? To be equal to the wage proposition it should provide equal or better wages, interest on the investment, and keep or maintenance of farm machinery and horses.

Something on interest and wages will be returned by the home being provided on the farm, and besides much of the fruit, all the vegetables and the wheat for flour may be grown on the farm and obtained without any cash outlay. The same is true for the poultry and the eggs, and for the milk, cream and butter needed. With five miles from Bozeman, last fall threshed 75 bushels of wheat per acre from a 70 acre field and sold the crop for $45 per acre; $10 per acre would pay very well for the labor and expense of growing and harvesting the crop. Thus the gross return from 40 acres would be $1,800, and the net return $1,200. One hundred bushels of

Prof. F. B. Linfield, Director Montana Experiment Station, Bozeman, Montana.

the saving in rent and on the living grown on the farm, fully half a laboring man's expense is produced directly from the farm with but little or no cash outlay.

But what will a 40 acre tract under irrigation produce? A few illustrations will perhaps best answer the question. George Allen, living some oats per acre is a common crop for the good farmer. At 1 cent a pound, this means $35 per acre. If we again allow $10 per acre for expense, it would give $1,200 as a gross return, and $800 as the net return from 40 acres of ground.

In the Yellowstone valley five to six tons of alfalfa hay per acre is a

common crop. At $4 per ton this is $20 to $24 per acre; $8 per acre will be a large price for producing and handling this crop. At six tons per acre, this would give a gross return of $560 from 40 acres of land.

If this alfalfa hay was fed to stock, particularly to dairy cows, these returns could be nearly doubled.

The writer has pastured two milk cows on one acre of ground and obtained 200 pounds of butter fat. At 20 cents per pound, this returns $10 per acre, or $1,600 from 40 acres. The above crops can be produced for a minimum outlay of labor. A man and a team could do practically all the work. In the above illustrations the returns from but one crop were considered, but a combination of many of the crops mentioned would be the ideal farm practice. If livestock were handled this would spread the work over the year and the returns on these variety crops will be in proportion of the acreage of each, and would give the maximum return of from $800 to $1,600 per year from the 40 acres, in addition to providing a home and many of the living expenses.

In the above estimate none of the crops expensive to raise have been considered. Potatoes, sugar beets, garden truck and fruit of all kinds call for larger outlay of labor, but they are correspondingly larger producers and give greater returns per acre.

Something in these kinds of crops should be grown. However, the extent of these crops that might be grown will be determined by the time available for properly caring for them. To yield the largest returns, the work of the farm should be so planned as to afford profitable employment the year around. The farmer on 40 acres has to be a manufacturer, a concentrator of farm products as well as a producer of raw material. When properly managed, this will bring not alone income, but larger profits.

I have known many families in the East raised on a farm of 50 acres with comfort, with sturdy bodies and vigorous, active minds. From 20 acres of Montana's irrigated land I have seen more grain and hay produced than on many of the best of these 50 acres farms. Forty acres is enough. Rightly farmed, it will give any man a comfortable living. It will give to every man a neighbor at his door. It will give to the country resident all the advantages of the urban resident without his disadvantage. It will bring to the rural home the best social, educational and religious advantages.

PARANG AND COGONALES IN THE PHILIPPINES

BY

WILLIAM M. MAULE
Forester, Philippine Bureau of Forestry.

FROM earliest times man, through various motives, has wrought havoc with the forest. The natural outlines and distribution of forest areas are determined largely by geographical location and the physiographical features, or, in short, the factors which determine climate. Everywhere we find these outlines more or less modified by artificial influences.

There is little doubt but the greater portion of the grass areas and semi-open "parang" lands characteristic of many portions of the Philippine archipelago are due to the fixed custom of indiscriminately clearing and burning for purposes of temporary planting or for the chase.

The open character of certain forest areas leads one to believe that the geo-

logical formation interferes with tree growth. Such areas, however, are small and unimportant when compared with those whose open condition we attribute to the interference of man.

TYPES.

According to cover, we may readily distinguish three types of public lands whose formation has been effected by artificial means and is, therefore, inconstant. These are: Closed forest, semi-open or "parang" and open grass lands or "cogonales."

This paper will not attempt to deal with the first type, but will briefly consider the more open lands.

Vidal, who was the first to adopt the Tagal word "parang" as a technical term, defines it as "land covered with brushwood and invading species which have substituted the original forest species." These areas in general represent tracts which were originally forested, but subsequently cleared, planted, and are now abandoned and reverting back to forest cover.

The first tree species to appear are usually of little value as timber producers, but, as we shall see later, serve their purposes well as fosters.

"Cogonales" may be called an early "parang" stage. They are lands free at first of tree growth and heavily set with "cogon" (*Imperata arundinacea*), a perennial grass from three to five feet high. The relative proportion of these areas is quite variable. In certain provinces the open lands are insignificant, while in others they may occupy as much as 30 per cent. of the total area. Having been selected primarily for the growing of crops, such soils represent the most fertile portion of the non-cultivated areas, and, as a rule, occupy the low rolling foothills adjacent to the cultivated plains, which they separate from the upland forests.

Parang.

DAMAGE.

At the present time, the greatest damage wrought to our Philippine forests is the making of clearings, and especially those of a transitory nature. The natives are well aware of the fertility of cleared and burned forest areas, and do not hesitate to sacrifice a good stand for the mere purpose of growing one or two crops of cereals. In some instances a portion of the timber is utilized, but the general rule is to cut and burn.

Tranistory clearings are those usually planted with cereals or other annuals, and are held at the most but two or three seasons, when they are abandoned to nature and new areas selected. In this manner, the open lands increase year by year to join the "cogonales."

On the other hand, where soil and climate are favorable, we find clearings made with a view of permanency, where the lands are cultivated and planted to permanent crops, such as cocoanuts, abaca, rubber, etc., thereby adding to the wealth of the community. Such clearings are justifiable.

Inasmuch as we find the temporary clearings more wasteful than those held permanently, so are we able to distinguish two classes of people making them. The former comprise a less law-abiding class, whose habits are semi-nomadic, while the latter are more frugal and industrious.

SEASON OF MAKING.

As may be inferred, the making of clearings is not especially difficult, when advantage is taken of the dry season, usually during February, March, April, and May, at which period the newly felled timber rapidly becomes dry and burns with ease.

Planting is done early in June, at which season the growth of crops is favored by copious rains, which continue until September. The planter usually erects a small house on his claim, where he bides the time and watches the crop until harvest, after which he retires to an adjoining barrio.

On the advent of the following season, only a small portion of former claims are replanted, as the fresher soil of a new clearing is preferred. Lands once set with cogon, especially those of the hill regions, are of little value when reclaimed. The soil, having lain long exposed to erosion, becomes thin and unproductive. The heavy root stalks, by which cogon reproduces vegetatively, render it difficult to eradicate. This, together with the fact that forest soils are fresher and more easily worked, explains why the latter are preferable to the former. On private lands which are level and retain their fertility, cogon areas have been reclaimed for agricultural purposes. The Bureau of Agriculture employ methods by which cogon is destroyed in one season. The land is plowed and sown with legumes, at a cost averaging $3.00 per acre.

ABANDONED.

Clearings which are abandoned after one season still retain a certain number of stumps which will coppice; the soil is loose and more receptive to seeding than on those areas which have been planted for a longer period. Reforesting by means of coppice alone, however, cannot be relied upon, as but few species sprout at all, and, if they do, rarely attain tree size. The chief value of coppice here lies in the protection which they afford the soil in preventing a rapid evaporation of soil moisture, erosion, and, finally, the entrance of cogon. The value of a leaf cover in dissipating the heavy rain fall is well shown by the accompanying illustration.

Clearings which have been planted for two or three seasons and abandoned are found to have lost all volunteer growth; the soil becomes dry and is seldom receptive to natural seeding.

Burns-Mordoch, Conservator of Forest of the Federated Malay States, writing of "Lalang" (*Imperata cylindrical*), a closely related species of "cogon," says:

"Cleared land in this country if not constantly kept clean becomes covered

with "Lalang" (*I. cylindrical*), the "Thetke" grass of Burma, but this grass here grows with such strength as to prevent young trees from taking hold. It is liable to fires and is benefitted by them, so much so that in large "Lalang" wastes that are regularly burnt over, it is doubtful if natural reafforestation would ever occur. The cost of regular plantations is increased enormously, owing to the necessity of most thorough clearing."

NATURAL REFORESTING OF CLEARED AREAS.

A study of natural reforesting of cleared areas presents an interesting example of Nature's methods and shows the comparative ability of various species to endure light, or, more properly, drought.

Clearing in Forest Planted One Year.

The most successful examples of natural reforesting, because they are better protected from fibre and other

harmful influences, are found on the smaller, isolated areas throughout the forests. The following specific example will be cited as one of several ways by which natural reforesting takes place.

In effecting the transition back from clearings to high forest, the initial step is taken by a small, woody plant, "Cupao-cupao" (*Flemingia strobilifera*). This plant is one of the very few that can endure extended drought, and not only grows well among the cogon, which it gradually replaces, but is seldom killed by fire. After establishing itself well and affording a certain amount of shade, which conserves small amounts of moisture, we find conditions which will permit the entrance of Bayabas (*Psidium guayava*) and Alalangad (*Albizzia sp.*), either of which are trees of the open or semi-open, and are intermediary in effecting steps from open grass lands back to forest cover.

An important and valuable characteristic of these species is that they will reproduce vegetatively, and are thereby of service where the parched soil prevents the germination of seeds.

Clearings having become set with the drought-enduring species, such as those noted above, pave the way for the better forest species and gradually partake of a nature peculiar to the surrounding forest.

In the Remban district of the Malay States, "Tembusa" (*Fagraea fragrans*) is one of the few trees which is able to grow on "Lalang" or cogon areas, and which it soon conquers.

FIRE ON GRASS LANDS.

Under the caption of clearings may properly be included the destructive influence of fires, which annually—or more frequently—sweep over the open grass lands. These fires are usually confined to the dry months of February, March, April, and May, and during the rainy season which immediately follows there springs up tender grass suitable for grazing. At this season deer are attracted to the open and are more easily hunted. Such fires are usually started by hunters, who have held the custom from remote times. Owing to the rapidity with which these fires travel, driven before the wind, and the difficulty of finding the author, the practice remains a hard one to overcome.

Recent experiments by the Bureau of Government Laboratories show that cogon will furnish good paper material, and in the event of its extensive use for such a purpose, doubtless the natives, with view to reaping profit therefrom, will protect these areas from fire.

While it would be of advantage to place fires under control of all areas, it is especially important to do so where the grass lands terminate abruptly at the edge of high forest, where each succeeding fire causes them to recede.

During each rainy season, a certain amount of tree growth springs up on the grass lands. Some of the more hardy survive, but the majority succumb to drought or are killed by succeeding fires. Many rocky slopes are naturally seeded with Molave (*Vitex littoralis*). This species is moderately drought-enduring, and, were it not killed by fire, would no doubt spread gradually over considerable areas.

CONTROL.

The control of artificial clearings such as usually follow excessive cuttings has been found much more simple than that of firing the open grass lands, and there is little doubt that the latter causes less direct damage to the forests.

The forest service of India, in dealing with much the same conditions as exist here, has found the problem of fire protection to be one of the most difficult with which it has to contend. The people were taught that injury to the forest was an offense. Large areas were formerly destroyed by fire and axe in order to gather a few uncertain crops of cereals. The grazing question with which they had to deal—and one which is important in many countries—need scarcely be considered here. India has found that a gradual

introduction of strict protective measures has resulted in less friction than when the question has been attacked abruptly.

The question of influence of forests in conserving the water supply, while being an important one, cannot be so grave here as is experienced in countries whose climate allows the accumulation of a thick humus to cover the forest floor, and where rainfall is less abundant.

The warm climate and continued moisture of these islands promote rapid decomposition of the forest litter, so that the small quantities that damp soil, even though practically void of humus, collect and conserve immense quantities of water during the rainy seasons, gradually releasing it during the succeeding dry months.

Nowhere has the writer seen the effect of deforestation so pronounced as in the southern portion of Rizal province. Here the watersheds which were formerly forested have long been exposed and are now mixed parang and cogonales. The rolling aspect of the country is extremely dry during three or four months of the year, at which season but few streams find their way to the lake. Certain of the ravines

Protective Value of Crown Cover Against Heavy Tropical Rains.

are allowed to accumulate conserve an insignificant quantity of water.

The question of erosion is an important one, not only regarding its influence on future forest growth, but from its bearing on agricultural soils of the low lands. Beyond the considerable benefit which the dense cover of tropical forest affords, by dissipating the force of heavy seasonal rains, wherever such may occur, and by retarding subsequent rapid evaporation, factors largely determining or regulating the "flow-off" are topographical, and the character of the soil of the broad forested slopes, with their farther inland are still wooded and here water may be found throughout the year, but during their course through the open country the smaller streams are gradually absorbed and only the larger ones find their way to the lake.

One would naturally expect that the grass-covered areas would be of great value in retarding erosion, and such would be the case were they not burned over during the dry months just prior to the rainy season, which exposes those areas to the beating rains.

The question of forest protection is one that stands among the foremost

in a forest policy, and, among the various conditions studied from which to draw conclusions, the status of the people whom it most concerns is not the least important.

The wasteful custom of making clearings in these islands is deeply rooted and is one that has been practiced for years with scarcely any restraint. Very satisfactory results are ensuing from making arrests, which seems to be the most effective way of solving the problem. During the past two years many arrests have been made, which has resulted in an appreciable decrease in the making of clearings.

PUMPING WATER

Fourth Paper—Suggestions for the Construction of Small Pumping Plants for Irrigation—Kind of Wells Adopted for Securing Water from Gravels

KIND OF WELLS ADAPTED FOR SECURING WATER FROM GRAVELS.

The most economical well for securing water in the quantities needed for irrigation is a well from 12 to 15 inches in diameter, extending into the water-bearing gravels 30 to 60 feet, according to the thickness of the gravels at the place where the well is drilled. Strainers for these wells can be made of slotted galvanized iron. The perforated metal should be placed opposite all the coarse gravels, or at a depth of 10 feet below the surface of the water. These strainers can be made by any mechanic by punching ⅛ by 1 inch slots into heavy galvanized iron and then riveting the sheets into cylinders of the proper diameter. The cylinders should be rolled in such a way that the burr made by punching the slots will come on the outside of the finished casing, so that the slots will be vertical. A much better strainer can be made by purchasing the metal in sheets already perforated. For this purpose steel sheets 48 by 120 inches in dimensions, perforated with hit and miss slots, 3-16 by 1 inch, and galvanized after the perforations are made, will make ideal strainers. When rolled into cylinders these sheets form a casing about 15 inches in diameter. In constructing the well the perforated sections should be put in place, one above another, to within about 10 feet of the water level; from this depth upward the casing should not be perforated.

AMOUNT OF WATER THAT CAN BE OBTAINED FROM THE WELLS.

Wells constructed as above, in gravels similar to those in the South Platte and Arkansas valleys, will furnish at least ¼ gallon of water per minute for each square foot of strainer surface in the well, when the water in the well is lowered 1 foot by pumping. If the water in the well is lowered 10 feet by pumping, the amount of water recovered should amount to at least ten times as much, or 2½ gallons per minute per square foot of strainer. If a 15-inch well is drilled in good water bearing gravel to a depth of 40 feet, the lower 30 feet of which is strainer surface, and if the pump lowers the water in the well 10 feet, the amount of water supplied by the well should amount to at least 300 gallons per minute. A careful test of the water works at North Platte, Nebr., showed that the strainers in the wells were furnishing 3-10 gallon of water per minute per square foot of strainer surface, when the water in the wells was lowered 1 foot by pumping. The average of eleven pumping plants in the Arkansas valley kas 0.33 gallon of water per minute for each square foot of strainer surface under one foot head.

For small pumping plants a single well of the depth indicated above would probably be sufficient, but if good water bearing gravels do not extend to the requisite depth, it would be necessary to increase the number of wells and connect several of them to the pump.

arrangement of the wells. Two different methods will be found available for this purpose. If the amount of water required is not greatly in excess of that which can be supplied by a single tubular well it is often found practicable to construct a large dug well, 6 to 10 feet in diameter, to a

Fig. 1—Well strainers made of slotted galvanized iron. These strainers are 15 inches in diameter, and ten feet long, provided with 3-16 by 1 1-4 inch hit and miss slots, punched before the steel is galvanized. The strainers shown in the diagram were made of No. 18 wire gage sheet steel.

DISTANCE BETWEEN WELLS.

If it is necessary to construct several wells in order to secure the amount of water required for an irrigation plant, it becomes important to consider the best and most economical

depth of 5 to 10 feet below the water level, inserting in the bottom of the dug well several feeders of perforated galvanized iron, as described above. This method has the advantage of permitting the pump that is to recover the

water to be submerged in the water of the well. A well of this sort is shown in Fig. 2.

In order to sink a dug well the proper distance below the water level it is necessary to construct a wooden, brick, or concrete crib that will sink as the material is removed from its interior. The crib of the well shown in Fig. 2 is made of wood, and is made larger at the lower than at the upper end to facilitate sinking.

Another method of recovering a large quantity of water is to sink a battery of wells and connect them by suction pipe to the pump. This method is adapted to secure a larger supply than the method just mentioned. Three or four, or more wells can be arranged in a straight line, 20 to 30 feet apart, and connected to a pump placed near the center of the row of wells. In the diagram (Fig. 3) will be found an arrangement suitable for a battery of eight to twelve wells. These wells are arranged in pairs, close together, each pair of wells being 40 to 60 feet from the next pair on the same suction line. The object of placing the wells close together in pairs is for the purpose of removing a large amount of the fine sand from the water-bearing gravel. This can be done in gravels like those found in the Western valleys by pumping vigorously from one of the pair of wells, and at the same time running clear water into the neighboring well. By this means it should be possible to clear out all the fine material between the two wells. If the water-bearing gravels are of the kind usually found in the river valleys of the Western prairies, a pumping plant can be constructed sufficiently large to supply from 2,500 to 3,500 gallons of water per minute without lowering the water more than 10 feet. Pumping plants of greater capacity than this will usually not be profitable. A large number of moderate sized plants is more desirable than a few large ones.

KIND OF PUMP.

Probably the most satisfactory pump for use in irrigation is the centrifugal pump. However, there are many kinds of small centrifugal pumps. It does not pay to purchase any but the very best machinery for the pumping of water, as poorly designed machinery soon proves too expensive. The various kinds of pumps differ greatly in this respect. The centrifugal pump used by the irrigator should be of the *enclosed runner* type, provided with self-oiling bearings of the oil ring type. There are several excellent makes of centrifugal pumps on the market, and any of them will do good work if the size and design of the pump fit the conditions under which it must work. The maker of the pump should have full information of all the conditions under which the pump is to be installed. These conditions should include the distance that the pump must discharge the water above its outlet; also the amount of suction or the distance the water must be lifted below the pump inlet. The following points are important to those about to install pumping plants:

1. The efficiency of the centrifugal pump under actual working conditions is higher for the large size pumps than for the small size. Pumps having less than 3 inches diameter discharge pipe will show a low efficiency.

2. A centrifugal pump will work better and be more efficient if the suction pipe is as short as possible, relative to the length of the discharge pipe. On this account the pump should be placed as near the level of the water as the securing of a good foundation will permit.

3. If the pump is to be driven by means of a belt, it should be provided with a large pulley. The pulley usually supplied with the pumps is so small that a great amount of slipping takes place between the belt and the pulley, and the efficiency of the pump is greatly decreased. Of course it is necessary to secure the proper proportion between the size of driving and driven pulleys, but both should be larger than are usually furnished with pumps and engines.

4. The suction pipe on the pump and the discharge pipe should be large.

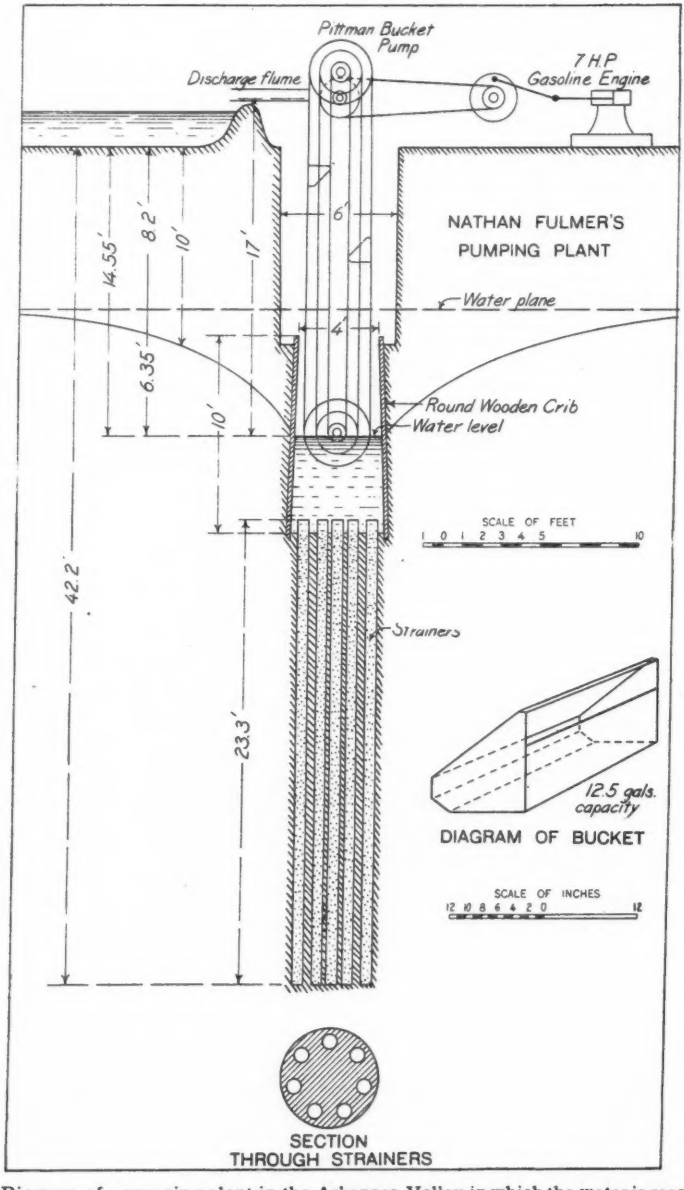


Fig. 2—Diagram of a pumping plant in the Arkansas Valley in which the water is recovered from a dug well having a wooden crib, in the bottom of which are placed seven galvanized iron strainers or feeders. A chain and bucket pump is used on this well. Better results would undoubtedly be obtained by using a vertical shaft centrifugal pump submerged in the open well.

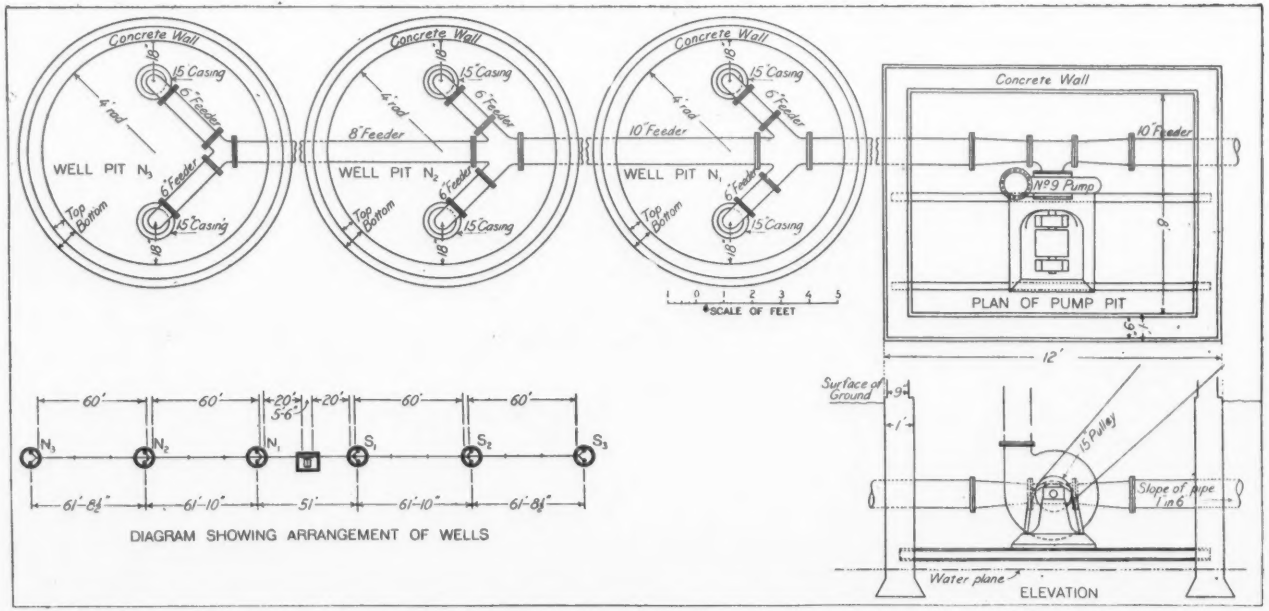


Fig 3—Suggested arrangement of wells and pump for a pumping plant designed to recover 2,500 gallons of water per minute. In places where the gravels are very deep and unusually coarse, the wells at the end of the line of suction pipe may be omitted. The plant consists of a central concrete pump house and a group of 12 wells arranged along the suction pipe leading to the pump. The suction pipe should be placed underground as near to the level of the ground water as practicable.

A No. 4 centrifugal pump that draws water from a single well should have at least a 6-inch suction pipe, and the discharge pipe should gradually increase from 4 inches at the discharge opening of the pump to 8 inches 3 feet above the discharge opening, and continue this size until the flume or discharge conduit is reached. The discharge pipe can be made of riveted galvanized iron, and the suction pipe can be made either of standard pipe or good well casing.

5. A centrifugal pump loses its efficiency at once if there is an air leak around the stuffing box, or at any place in the suction pipe. Many centrifugal pumps are now provided with a water seal around the stuffing gland that insures the absence of leaks at this point.

A good centrifugal pump with enclosed runner should show an efficiency of about 60 per cent. on a 30-foot lift. Single stage centrifugal pumps, constructed with bronze runner made in two pieces so that the interior could be machined and smoothed, have shown an efficiency of about 80 per cent.

METHOD OF PRIMING PUMPS.

A large number of pumping plants are installed with foot valves at the bottom of the suction pipe. When these are provided, a centrifugal pump is always ready to start after it is once primed. The foot valves usually interfere very materially with the flow of water into the pipe, and its is undoubtedly more economical to omit them and place a flap valve at the upper end of the discharge pipe which can be lowered when it is desired to start the pump. An ordinary cast-iron house pump connected to the top of the casing of the centrifugal pump can be used to prime the pump with water before starting.

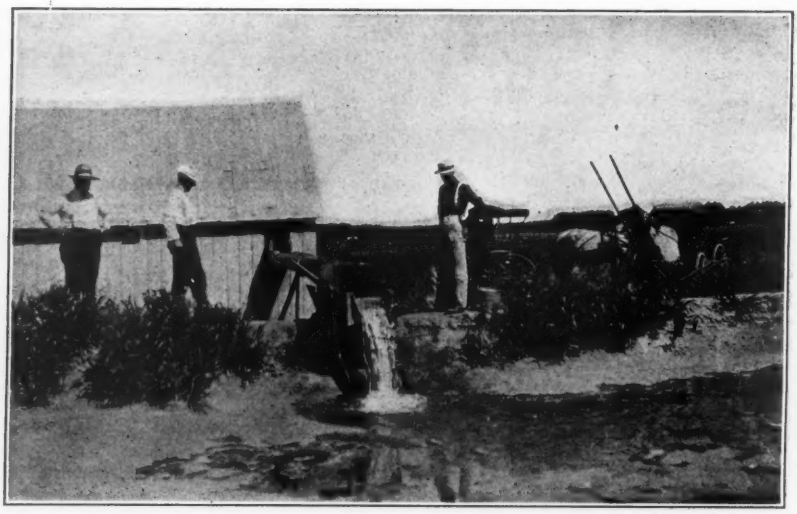


Fig. 4—Measuring weir at pumping plant near Garden City, Kansas. At the time the photograph was taken the pumping plant was yielding 200 gallons of water per minute

PIPE FITTINGS.

The suction pipe installed by those who construct pumping plants is not only usually too small for the best results, but the elbows and tees used are ordinarily very poorly adapted to

the purpose intended. It is a common practice to use steam pipe fittings for this purpose. In consequence the water is required to turn at sharp angles at the tees and elbows, and the best results cannot be attained. In order to avoid this difficulty "long sweep" fittings should be purchased. These are standard trade goods and can be obained from any of the large dealers in pipe fittings.

SOURCE OF POWER.

A popular source of power for small pumping plants is the gasoline engine. Where the price of gasoline is high, it is very easy to make the cost of water prohibitive by the use of such power. Whether or not it pays to pump water by gasoline is a matter which depends very largely upon the distance the water must be lifted, but also upon the kind of crop that is to be irrigated. Gasoline, even at a high price, is usually a cheaper fuel than coal in an ordinary steam engine of small horse power, such as a common traction engine. For plants requiring from twenty to thirty horse power, producer gas generators can be installed which will keep the cost of pumping down to a minimum. A suction gas producer, using anthracite pea coal for fuel, should furnish power at the rate of one horse power per hour for each pound and a half of coal consumed. At $8.00 per ton, the cost of coal should be equivalent to gasoline at four to six cents per gallon.

In large plants, requiring from fifty to one hundred horse power, or more, a condensing Corliss engine is sufficiently economical where the cost of coal does not exceed $3.50 to $4.00 per ton.

ECONOMICAL HEIGHT WATER MAY BE LIFTED.

It is very unlikely that it will pay to pump water, under present conditions in the valleys of the western plains, to a total height of more than 30 feet, including the suction lift of the pump. If the pump lower the water in the wells 10 feet; and if the distance to water be 10 feet below the ground, and the discharge pipe be brought into a reservoir or flume 5 feet above the surface of the ground, the total lift will be 30 feet, if 5 feet be added to cover loss of head due to friction in suction and discharge pipe.

STORAGE RESERVOIRS.

In order to irrigate economically from pumping plants it is usually desirable to pump the water into a reservoir having a capacity equal to the amount of water the plant can furnish in 6 to 8 hours. Such a reservoir is absolutely necessary for best results with small pumping plants. If the supply of water exceeds 500 gallons per minute it is possible to dispense with the reservoir, especially if the supply greatly exceeds this amount. Plants furnishing over 1,000 gallons per minute can usually be best operated without the use of a reservoir.

COST OF PUMPING.

The cost of recovering ground water from wells is made up of four principal items: (1) fuel and supplies; (2) labor; (3) depreciation and repairs; (4) interest on the first cost of the plant, or on the capital invested. The first and third of these items are partially under the control of the owner of the plant. If the installation is carefully designed and its parts well proportioned, the cost of fuel can be kept at a minimum; and similarly, the charge for depreciation and repairs will be kept low if good machinery be purchased in the first place, and careful attention be given to its maintenance when in operation and when idle. The charge for depreciation will be as great, if not greater, when the plant is not running as when running. The rate of depreciation when idle will greatly exceed the rate when running, if the machinery is neglected and carelessly exposed. The charge for depreciation and repairs should not be estimated at less than 10 per cent. of the first cost of the plant.

APPROXIMATE COST OF FUEL REQUIRED TO PUMP 1,000 GALLONS OF WATER PER MINUTE, FOR VARIOUS LIFTS:

Total lift.	Engine horse power required	Cost per hour of fuel, gasoline 16 cents per gallon.	Cost per hour of fuel, gasolene 20 cents per gallon.	Cost per hour for coal at $8.00 per ton in suction gas producer plant.	Cost per hour for coal at $4.00 per ton in condensing steam engine.	Cost of depreciation and repairs on machinery, etc., per year.
Feet		Cents	Cents	Cents	Cents	Dollars
10	16	11.2	14	4.2	6	70
20	11	22.4	28	8.4	12	140
30	16	33.6	42	12.6	18	210

NOTE.—1,000 gallons of water per minute pumped continuously for eleven hours is equivalent to two acre feet of water.

The accompanying table gives an estimate of approximate cost for fuel and maintenance of a pumping plant having a capacity of 1,000 gallons of water per minute for total lifts of ten, twenty and thirty feet.

In order to determine approximately the cost of pumping water any distance between twenty and thirty feet, a proportional part of the cost for ten feet can be added to the cost for twenty feet. Thus, to get the cost of pumping water a distance of 25 feet, half the numbers in the first line of the table can be added to those in the second line. The table should only be used for estimating the cost of pumping water for lifts lying between twenty and thirty feet. The cost for ten feet is given for the purpose of making estimates, but it should not be supposed that the cost for this low lift would be merely half of that for the twenty foot lift, as friction losses and others would tend to make the cost for the low lift higher than that stated in the table.

FIRST COST OF PUMPING PLANTS.

At almost any point in the river valleys of the western plains complete pumping plants, including wells, machinery and buildings, can be constructed for about $100 per horse power required. In some exceptional cases the cost may run as low as $60 per horse power.

The pumping plant of Mrs. M. Richter, near Garden City, Kan., uses a Menge pump which is run by a 10-horse power Otto gasoline engine. The area of the strainer and the bottom of the well is 266.5 square feet. The specific capacity per foot of percolating surface is .341 gallons per minute. The cost of operation with gasoline at 20 cents per gallon amounted to 21 cents per hour, .89 cents per thousand gallons, $2.90 per acre foot, and 1-17 cents per thousand foot-gallons.

The pumping plant of Nathan Fulmer, near Lakin, Kan., utilizes a chain and bucket pump. The power is supplied by a Howe gasoline engine which develops about 7 horse power at 285 revolutions per minute. The cost of gasoline at 21 cents per gallon and the expense of running the engine was 13.65 cents per hour. The cost of water was $1.37 per acre-foot, .22 cents per thousand gallons, and 1-40 cents per thousand foot-gallons.

The pumping outfit of J. H. Logan near Garden City, Kan., consists of a 6-horse power horizontal gasoline engine connected by a belt to a No. 3 centrifugal pump. The specific capacity of the well is 422 gallons per minute, or 3.94 gallons for each square foot of well strainer. The fuel cost of pumping was .9 cents per thousand gallons, $2.93 per acre-foot, or 1-25 cents per thousand foot-gallons.

The cost of pumping at 12 plants in the Arkansas Valley in Western Kansas ranged from $0.85 to $3.75 acre-foot.

FOREST LEGISLATION BEFORE THE 59th CONGRESS—FIRST SESSION

THE following Acts, which bear more or less directly upon forest reserve interests, were passed at the last session of Congress:

Act of March 15, 1906, permitting agricultural settlement in a certain restricted portion of the Yellowstone Forest Reserve.

Act of March 16, 1906, to provide for an annual increase in the appropriation for agricultural experiment stations until the total for each State and Territory shall be $30,000. Such stations as desire to do so can turn part of this added income toward experiments in forestry.

Act of May 1, 1906, to grant the Edison Electric Company a permit to occupy land in the San Bernardino, Sierra, and San Gabriel Forest Reserves for electric power plants. This law was drawn in cooperation with the Forest Service, which approved it as an entering wedge for a uniform law with regard to rights of way and privileges upon all land owned by the United States. Its salient features are:

(1) That it grants an easement to the permittee, thus making his tenure certain for some definite length of time.

(2) That the Secretary may fix the duration of the permit to suit the needs and the magnitude of the project involved in the permit.

(3) That construction work must be completed within a definite time and the privilege enjoyed beneficially for a reasonable time each year.

(4) That the Secretary may exact from the permittee such reasonable annual rental charge as he deems proper, changing it from year to year as circumstances seem to warrant.

Act of June 4, 1906, to punish the cutting, chipping, or boxing of trees on the public lands. This law was passed to prevent the practice of going upon the public domain and destroying resin-bearing trees by conducting turpentine operations. The Commissioner of the General Land Office has already agreed to investigate turpentining in Florida and bring action against trespassers on the public land.

Act of June 8, 1906, to preserve American antiquities. This Act provides that the Secretaries of the Interior, of War, and of Agriculture may join together to make such rules and regulations for excavation and study of historic or prehistoric ruins or monuments or other objects of antiquity upon the public land under their respective jurisdictions, as they may deem necessary to protect these antiquities.

Act of June 11, 1906, to provide for the entry of agricultural lands within forest reserves. (Described fully in FORESTRY AND IRRIGATION for June, 1906.) This law makes it possible for the Secretary of Agriculture to list for entry under the homestead laws, such tracts of agricultural land as he may find within forest reserves. It should do much to allay criticism of the National forest policy and at the same time bring within the reserves a desirable class of inhabitants available for protection against forest fires and timber depredations.

Act of June 11, 1906, to accept the recession by the State of California of the Yosemite Valley and Mariposa Big Tree Grove. This law brings these important parks again under the control of the United States Government, and incidentally modifies, to a slight extent, the boundary of the Yosemite National Park. The change will probably be advantageous, since the State of California had not appropriated the money necessary to care for the Yosemite Valley.

Act of June 27, 1906, to grant lands to the State of Wisconsin for State forest reserve purposes. By means of

this law the Wisconsin forest reserves will be helped to a considerable extent.

Act of June 29, 1906, to permit the President to designate such areas in the Grand Canyon Forest Reserve as should, in his opinion, be set aside for the protection of game animals. Owing to a horseshoe bend of the canyon there is a certain portion of that forest reserve which, by building a short fence, can be completely cut off from the surrounding country. This will furnish an unusually secure breeding place for the native game animals and those which different societies may wish to import.

Act of June 29, 1906, to create the Mesa Verde National Park.

Act of June 30, 1906, (Agricultural Appropriation Act). This law provides as follows:

(1) That the forest reserve special fund, which would otherwise cease to be available for the administration and protection of forest reserves in 1910, shall continue available until Congress takes action to provide otherwise.

(2) That ten per cent. of all money received from each forest reserve during any fiscal year, including the one just passed, shall be paid to the counties in which the reserve is situated for the benefit of the public schools and roads. Over $75,000 will be available for such counties at once, and the amount will increase rapidly from year to year.

(3) Permission to export forest reserve timber from the State or Territory in which it was cut is extended to cover all States and Territories and the District of Alaska, with the sole exception of the Black Hills Forest Reserve in South Dakota, where dead and insect-infested timber only may be exported.

(4) A special appropriation of $15,000 was made for building a wire fence and necessary sheds in the Wichita Forest Reserve to provide a range for a buffalo herd which is to be presented by the New York Zoological Society. An area has been selected for this enclosure, and the conditions of climate and forage are such that the buffalo herd will probably increase and last for all time.

Act of June 30, 1906, to authorize rights of way for the City of Los Angeles, Cal., through the Sierra, Santa Barbara and San Gabriel Forest Reserves for a sufficient water supply to meet all possible increase in the population of that city. The city is allowed in the meantime to use the surplus water for generating electricity and for irrigation purposes.

The principal bills, which were of interest but did not pass, are as follows:

The Appalachian and White Mountains Forest Reserve Bill passed the Senate and was reported as a Committee measure in the House. In the latter place, however, it was never called up for consideration. There seems to be considerable likelihood of its passage next year.

Senator Burkett's Grazing Bill was introduced in both Houses, but failed to receive any consideration owing to the pressure of such important measures as the Rate Bill, etc. The stockgrowers, however, have shown great interest, and many meetings of their associations have declared in favor of Government control. It looks very likely that this bill will be actively considered next year with a fair chance of becoming a law. The condition in the West on account of overgrazing, the insistent advent of new stockmen, and the conflict between sheep and cattle interests, is becoming too dangerously acute to be ignored. In a few years some irreparable damage to the forage-producing power of the range will have been done, and stockmen will be practically in a condition of civil warfare.

The Tawney Bill, for more definitely fixing the boundaries of the Minnesota National Forest Reserve and reimbursing the Indians for their land taken for public purposes, seemed to fail of passage merely because it was not taken up in Committee early enough in the year.

The General License Bill, spoken of above in connection with the Edison Electric Company's right of way, was not even introduced this winter, but will be a prominent factor at the next session.

A bill proposing to transfer the National Parks to the care of the Secretary of Agriculture, in order that they may be administered from a forest standpoint, received very little attention, and no prediction can be made concerning its treatment in the future.

Progress of Government Irrigation Work During Past Month

Important Decision

The Assistant Attorney General has just rendered an important opinion on the following questions:

First. Whether one who has made a homestead entry, not exceeding the farm unit limit, either under the provisions of the Reclamation Act or under the general law, may obtain water for such tract and also for one or more other tracts of which he is the proprietor, provided the area held in private owenrship does not exceed the private ownership limit fixed by the Secretary of the Interior.

Second. If the homestead entry was made prior to the Reclamation Act withdrawal and contains an irrigable area in excess of the farm unit limit, whether, for the purposes under consideration, the excess area is to be regarded as of the same status as land in private ownership.

The case in point is on the Minidoka project, Idaho, where certain state lands fall within the irrigable area. The lands under this project have been classified and the farm unit fixed at 80 acres. The question arose as to whether a person who makes a homestead entry of 80 acres under the Minidoka project and also purchases 80 acres of state land may secure water from the Government works for the irrigation of both tracts. The point submitted involves a broad question applicable to all of the reclamation projects. The Assistant Attorney General holds that

"A person who has made or may make homestead entry of lands withdrawn for disposal under the act of June 17, 1902 (52 Stat. 288) and subject to the provisions, limitations and conditions of said act, may obtain water for such tract and may also obtain water for one or more tracts of which he is the proprietor, not exceeding the limit of area fixed by the statute, authorizing the use of water for land in private ownership, or as fixed by the Secretary of the Interior.

"If the entry was made prior to the withdrawal under the Reclamation Act, the entryman may be entitled to the right to the use of water for the irrigable area of the land entered, and also for such area of lands held by him in private ownership which added to the irrigable area of his entry will not exceed 160 acres.

"While there appears to be no restriction in the act upon the right of a homesteader to the use of water for

land owned by him to the extent of area allowed to any one landowner, it has been deemed advisable to administer the law through the instrumentality of water users' associations which are organized by the owners of lands within the project. By the contracts heretofore made with such associations by the Secretary of the Interior, only those who are or may become members of such associations will be accepted as entrymen or applicants for the right to the use of water which may be impounded or controlled by the works of such project.

"Under the articles of incorporation and by the laws of such associations, which are part of every contract, every member or shareholder of the association, whether he be the owner of lands or an entryman of public lands, is restricted in his holding to 150 shares of stock, one share being allowed to each acre or fraction thereof, so that, the Secretary of the Interior, by entering into a contract with such association, has fixed 160 acres as the limit of the right to the use of water by any one person, whether the land irrigated is entered as public land or is held in private ownership, or under both rights."

Chance for Cement Making

An investigation was recently made by the cement experts of the United States Reclamation Service to determine the existence and availability of raw materials for the manufacture of Portland cement in the vicinity of Havre, Mont.

An area exceeding 355 acres convenient to Assinniboine station, on the main line of the Montana Central Railway, Great Northern system, was found to contain an unfailing supply of natural cement rock. Suitable clay for an admixture, if needed at any time in the preparation of cement, is abundant on the ground, and the bituminous coal mines throughout the section furnish fuel adapted for the burning of the rock. A mill site and town site were located and large springs furnish an abundant water supply for domestic and other purposes.

The Reclamation Service has four large projects in Montana which have been approved by the Secretary of the Interior. Upon two of these work is well under way. The estimated cost of these four great works is $12,000,000, and upon their completion depends the reclamation of approximately half a million acres of land. Thousands of barrels of cement will be needed in their construction, and the service is naturally gravely concerned in the output of this material, as the present unprecedented demand for cement all over the West is already taxing the capacity of mills throughout the country to the utmost. It is believed that investors will embrace the opportunity presented by the known existence of materials suitable for cement manufacture in various localities in the West. The great profits arising from the successful conduct of the cement business is now too well known to require comment.

It is not the policy of the Government to go into the cement business unless through the inaccessibility of the works the success of a project should become jeopardized, as in the case of the Salt River project, Arizona, where the great distance from existing mills and the long wagon haul made the cost of cement prohibitive.

Gaging Stations Washed Out

The recent floods on Walla Walla and Umatilla Rivers carried away several gages of the United States Geological Survey, and at one station (Milton) washed away the whole station outfit, including the cable from which discharge measurements were made. At another station at Milton, on the South Fork of Walla Walla River, a new channel was formed, leaving the bridge and gage high and dry. Estimates of discharge during this flood have not yet been made for most stations. A discharge measurement made at the crest of the flood in the lower stretch of Umatilla River

shows the exceptional rate of eight second-feet per square mile for the drainage area of 2,270 square miles, or a maximum flow of more than 18,000 second-feet. Gaging stations on these rivers were of value to irrigation interests, those on Umatilla River having been utilized by the Reclamation Service in the consideration of the Umatilla project.

Payette-Boise Project

In order to preserve the priority of water right and thus render possible the completion of the work on the Payette-Boise irrigation project, in Idaho, the Secretary of the Interior has declared that an extraordinary emergency exists, under the provisions of the eight-hour act of August 1, 1892.

According to the laws of the State of Idaho, before performing any work in connection with the construction of projects involving the appropriation of water, it is necessary to file an application with the State Engineer for a permit to make such appropriation. This application must state the time required for the completion of construction of the proposed works, and the law requires that one-fifth of the work must be completed in one-half the time required for the completion of the entire project.

In order that the required amount of work on the Payette-Boise project may be completed within the time specified, it has been found necessary to rush the work of construction, which has been delayed by difficulty in obtaining early delivery of machinery and in securing laborers. It was also found upon opening bids for the construction work that a portion of the system must be done by force account, and the necessity of readvertising for bids caused much further delay.

Rapid Work in New Mexico

There was a surprised lot of farmers in the neighborhood of Malaga, New Mexico, a short time ago, when the Reclamation Service engineers turned the water into the Black River canal under the Carlsbad project.

The work on the project has been pushed rapidly in order to serve as large an acreage as possible during the season. The Black River canal was completed in May, including about 4,000 feet of concrete lining and a full head of water is being delivered to the farms in the vicinity of Malaga. The work was finished in double quick time, and the farmers got the water before they expected it, and a larger quantity than they counted upon; consequently, they did not prepare and plant all of the land that could have been cultivated. The old ditch leaked out threefourths of the water it diverted, but this fault is not found in the new canal. The Black River ditch diverts directly from Black River, a tributary entering the right bank of the Pecos River about 18 miles below Carlsbad.

The earthwork on the first three miles of the main canal of the Carlsbad project is practically completed, and another force is busy tearing out the old spillway at Dark Canyon, removing the present bank and making excavation for the seven-foot concrete pipe, and building new embankments. The large store house at Avalon dam has been completed, and the stone crusher is in place and nearly ready for operation. The bridge has been repaired and excavation has been begun for the core wall of the dam at the east end near the canal heading. Tools and machinery are arriving every day, and the force is being enlarged and organized for rapid and effective work.

Cooperative Work in South Dakota

The President has issued an order reserving the NE. ¼ of Sec. 24, T. 9 N., R. 5 E., Black Hills Meridian, South Dakota, within the limits of the Belle Fourche irrigation project, for the purpose of experimental work in agriculture, under the supervision of the Department of Agriculture, the tract, however, to remain under the general jurisdiction and control of the Reclamation Service.

Joint Conference

The Secretary of the Interior has called a conference to be held at Portland, Ore., or Seattle, Wash., this month between the engineers of the Reclamation Service and Chief Engineer Code, of the Indian Irrigation Service, and Mr. J. Lynch, superintendent of the Yakima Indian agency, to consider matters with reference to the reclamation of the lands in the Yakima Indian reservation in connection with the Yakima project.

Rio Grande Project

The Secretary of the Interior has executed a contract with the Elephant Butte Water Users' Association and the El Paso Valley Water Users' Association to secure to the United States the cost of constructing the Leasburg diversion dam and canal, Rio Grande irrigation project, New Mexico.

Gunnison Tunnel Work

The Reclamation Service engineers are justly proud of the progress being made on the Gunnison Tunnel in Colorado, which is being constructed by force account. The first mile, or one-sixth of the tunnel was completed on November 17, 1906. The first of the present month 13,767 feet had been excavated, 1,321 feet having been completed during the month of June. Night and day unceasingly the drills are breaking their way through the granite wall and the world's record in tunnel excavation has been established on the work.

Lippincott Resigns

Mr. J. B. Lippincott, consulting and supervising engineer in charge of work in California, has resigned his position with the United States Reclamation Service.

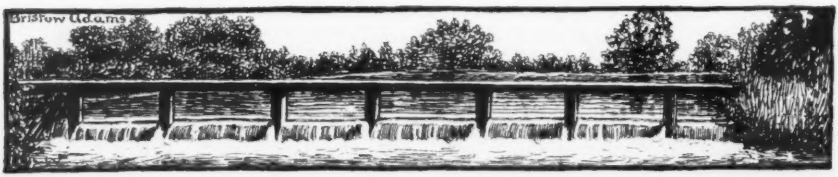
Mr. Lippincott, who is a graduate of Dickinson College, Pennsylvania, and the University of Kansas, has been engaged in civil engineering since 1886. For several years he was prominently connected with irrigation work in California in private capacity, and since 1895 has had charge of the hydrographic investigations for the United States Geological Survey in that state. He is one of the oldest engineers in point of service in the Reclamation Bureau, and the resignation of so able and energetic an assistant is greatly regretted by the officials of the department.

There is an increasing demand throughout the country for the services of first-class engineers, and owing to the limited salaries offered by the Reclamation Service the Government is losing many men of experience and ability.

Force work on Klamath Project

The Secretary of the Interior has granted authority to the Reclamation Service to prosecute the work incident to the construction of nineteen miles of canal and twenty-seven miles of laterals, with appurtenances, in connection with the Klamath project, California-Oregon, by force account, and to employ the force required to carry the work vigorously to completion in order that this distributing system may be ready for use when the main canal, now under construction, is completed.

The board of consulting engineers recently convened at Klamath Falls to open bids for this work reported that no bids were received. The time required to readvertise this work, it is believed, would so delay construction that it is improbable water could be provided for irrigation by next season.



Foresting Sand Hills

Reclaiming the barren sand hills of the Middle West with forest cover, to supply timber when there is a dearth of it, is one of the more striking of the important forest planting projects of the Forest Service. Four of the national forests have been established in the non-agricultural region with the express purpose of getting a firm grip on methods which will overcome natural difficulties and set up object lessons for the benefit of the people. These are the Niobrara, the Dismal River, and the North Platte reserves in Nebraska and the Garden City reserve in Kansas. The Nebraska reserves have responded so well to careful treatment that hundreds of thousands of seedlings have been planted out and millions more are being raised in nurseries for use in other reserves. Thus, for the first planting on the Garden City reserve, just completed, most of the trees were taken from the nurseries in the Dismal River reserve.

The Kansas reserve lies in a region of scattered, barren sand hills, interlaced with prairie on which grass thrives well enough to support live stock. The origin of these hills, in itself interesting, reminds one in a way of that of the sand dunes which encroached from the sea upon the fertile fields of western France and laid them waste. In both cases the wind has been the enemy of the soil, for in France wind drove the sand of the seashore inland, and in the middle western region of our own country wind drove eastward the sand which the Arkansas River had carried down in floods and afterwards exposed to dry. The sand hills were formed long ago, and the action of the wind is now largely checked by the spread of the carpet of grass, which binds the sand wherever there is enough moisture to encourage it.

The semiarid conditions of the region necessarily restrict the selection of trees. Right choice of species, the crux of forest planting generally, is here especially decisive. By its aid, together with right planting methods and right care of the plantation, a treeless region, one therefore in which wood is a scarce and a highly valuable commodity, can be made to produce useful woods, and at a cost so slight as to satisfy good business judgment. Thus on a light, sandy surface, whole only cover is wild grass and weeds, a merchantable forest crop is to be grown. In addition to the general demand for wood, there will be a special demand in connection with the Garden City irrigation project, which is within a few miles of the Garden City Reserve.

Honey locust, Osage orange, Russian mulberry, red cedar, and western yellow pine are the trees used in the new project, of which 51,000 came from the Government nursery, near Halsey, Nebr. The planting this season progressed under highly favorable conditions as regards weather and the physical condition of the soil, and at the expiration of six and one-half days thirteen men had completed the task at a total cost, exclusive of the trees, of $3.88 per acre.

A fence was built about the three-fourths of a section in which the plant-

ing was done, though part of this area remains to be planted next season. This was to exclude stock. To exclude prairie fires a fire guard was ploughed about the plantation.

Kiln Drying Tupelo

The Forest Service has made a successful demonstration of kiln-drying tupelo, the experiment being undertaken in coöperation with a lumber manufacturer in Louisiana, who deals in tupelo, and with a wagon manufacturer in Michigan. The lumber was cut in the former state and shipped directly to the latter, where it was put through the dry-kiln without preliminary seasoning. Tupelo is a wood suited to many commercial uses, and one to be profitably lumbered in connection with cypress, with which timber it occurs. A drawback to the use of tupelo has been the difficulty of seasoning, since it is subject to warping, checking, and staining in the seasoning process. Hence a demonstration of success in kiln-drying the wood without any of these defects is of great value to the tupelo industry.

In the experiments the kiln used is that known as the blower type, operated on the moist-air principle of drying. The hot air is forced by fans into the dry end, thence passes back through the trucks of lumber to the wet end, and is returned to the engine room through a large drying chamber over the kiln itself. The whole structure is as nearly air-tight as it can be made; consequently the same air, passing through the kiln and back over the steam-heating coils, is used over and over again. The necessary moisture is obtained from the green lumber as it is put into the wet end of the kiln.

The lumber should enter a temperature of about 93 degrees Fahrenheit at the wet end of the kiln. The temperature gradually increases as the truck moves toward the dry end, where it should stand in a temperature of 140 degrees to 150 degrees Fahrenheit for two or three days. In the experiment described the average temperature of the wet and dry ends was respectively 98 degrees and 133 degrees Fahrenheit. In this particular case the relative humidity at wet and dry ends was 84 per cent and 29 per cent, respectively.

As has been demonstrated in air-drying, so in kiln-drying, the correct piling of lumber is of utmost importance. The piles on the trucks should be arranged so that the spaces between the boards are not obstructed by adjacent courses, but remain open so as to give an upward vent to aid the circulation of the drying air. This can be accomplished by piling the wide boards apart from the narrow ones, or by laying the wide boards so that they do not extend over the open spaces. The old method of piling narrow and wide boards together so as to get horizontal and criss-cross circulation, is satisfactory in the open air where there are strong winds; but in a kiln, with only a few inches of space about the stack for air circulation, the lumber must be piled as openly as economical operation of the kiln will allow.

The boards in this experiment were from eight to twelve inches wide, one inch thick, and fourteen feet long. One truck was piled with the cross strips twelve inches apart, and another with strips eighteen inches apart. Equally good results were obtained by both methods. The lumber was in the kiln fifteen days, and when taken out was dried satisfactory without molding, staining, or stick-rotting. Only one board was checked as much as one foot from the end, and none of the other boards showed checks more than half an inch in length at the ends, while most were not checked at all. Five of the boards on the top course were slightly warped. There was a loss of 4,200 pounds, or one-third of the green weight, and a shrinkage of 127.2 board feet or 4.4 per cent of the original scale.

The method here described is that regularly used at this kiln in the drying of red gum, which occupied other trucks at the same time. Thus it was

shown that the tupelo can be kiln-dried by the same methods that are used for the red gum, and with equal success.

There is now in preparation Forest Service Circular 40, a comprehensive treatment of the "Utilization of Tupelo," which will soon be ready for distribution.

Use of Fire-Killed Timber

Although it has been known for a number of years that fire-killed timber has a considerable value in railroad and mining operations in Colorado, it has been brought out only recently by the Forest Service that a wide number of uses are open for this timber, and that in certain respects it has actual advantages over green wood.

These facts are deduced from a study of conditions on the Pikes Peak Forest Reserve, where the ravages of fire have been particularly widespread and destructive. In many instances the burned timber is the only kind available at a particular point, for example, in proximity to a mine or a spur of railroad, so for timbers and ties the dead material has been used for many years—fifteen years at Palmer Lake, seven years at Florissant for railroad ties, and longer than this for mine timbers. Three years ago it was first used for box boards and has proved excellent. In May, 1905, there was a sale for telephone poles.

The species used are red fir, yellow pine, lodge-pole pine, limber pine, range pine, pinion, Engelmann spruce, and blue spruce. Of these, the pines, red fir, and Engelmann spruce, furnish the bulk of the material. Time elapsed since burning seems to make no great difference in the value of the wood, except that when serious checking results it loses its value for box purposes. The timber used has been burned all the way from three to fifty-five years.

The amount o fthis timber which has been used is very considerable. There has been one sale from the reserve for box boards and one for telephone poles, but the three main uses continue to be mine timbers, railroad ties, and firewood.

Red fir is preferred for roailroad ties, then yellow pine, limber pine, and range pine. White pine has been objected to because of its lack of durability, but it is now taken in many places. At Rosemont, Colo., burned timber of all kinds is made into ties, some of the material having been burned fifty year ago. It is asserted that dry ties last as long and in many cases longer than green ties. On the Cripple Creek "short line" they were more satisfactory than green pine ties from Texas. Dry ties hold a spike well and a tie plate does not cut into the wood so seriously as it does in the case of a green tie. Englemann spruce is as good as other species as far as mechanical wear is concerned, but it decays much quicker and so should be given a preservative treatment.

Burned timber was first used for boxes by the Denver Crate and Box Company in February, 1903, the species used being Engelmann spruce and lodgepole pine, with some red fir and limber pine. The material used had been burned one one-half to four years. The Engelmann spruce was excellent, and the lodgepole pine also gave good results. The fire seasoning had driven the odor out of the pine so that it could be used for packing crackers and biscuits. Also, on account of the perfect seasoning the boxes remained tight when put up and therefore sold better than green boxes.

For mine timbers all species are used, if of the requisite size. Dry timber is preferred because of its lightness, durability, and stiffness, all principally due to its better seasoning.

For many purposes fire-killed timber should be preferred to green timber because it is so well seasoned. This seasoning makes it more durable than green timber, and also makes it lighter, so that its cost of transportation is appreciably less, and it is therefore available, not only for numerous local uses, but for shipping long distances. Actual experience with the fire-killed timber proves that its utilization should be a source of profit to the reserve.

WHITE ELM (Ulmus Americana)*

VIII.—Notes on Forest Trees Suitable for Planting in the United States

DISTRIBUTION AND MANNER OF OCCURRENCE.

THE White or American Elm has been distributed through natural agencies from southern Newfoundland westward along the northern shores of Lake Superior to the eastern base of the Rockies, and through the United States to the Black Hills, western Nebraska, Indian Territory, and Texas; southward it grows as far as Florida. It is infrequent in the extreme western and southern portions of its range, but appears in greatest abundance in the Northeast, especially in New England, where trees of remarkable size and beauty are found. The highest development is attained in the rich alluvium of the Connecticut River Valley.

Although seldom the most numerous species in a forest stand, the White Elm is widely and uniformly distributed in the East and is one of the most common trees. Its favorite place of growth is in rich intervales, or on fertile wooded slopes where moisture is constant and abundant. It will grow, however, in almost any soil, hence it may be found in nearly every open field, or woodlot, and along roadsides everywhere throughout the East. In the Middle West it is one of the most common species, but is more closely confined to river valleys than farther east.

The range advised for economic planting comprises all of the middle Western States, as far south as northern Texas. For purposes of shade and ornament, planting may be done throughout the entire range of the tree.

CHARACTERISTICS OF GROWTH—ASSOCIATE SPECIES.

The divided trunk and spreading vase, or broom-shaped crown, of trees grown in the open is well known. When grown in the forest the trunk remains a single stem and the crown becomes reduced in size. In the South and West, and in unfavorable situations, the tree becomes shorter, with a low, rounded crown not unlike that of the oak. Mature trees vary from 60 to 120 feet in height, and have a maximum diameter of eight feet. The elm usually has a rapid growth and a long life, although on sterile soils both these qualities are materially reduced. The most rapid growth is during the first 50 to 60 years; there is a falling off before the century mark is reached. The roots are long and fibrous, and run near the surface for a long distance. The tree can endure a moderate amount of shade. The associate species include nearly all of the common hardwoods, especially those with a preference for moist soils, as the walnuts, ashes, sycamores, Tulip-tree, birches, etc.

THE WOOD—ITS ECONOMIC USES.

The wood of the young elm is very tough, but is usually considered of not much value. When the tree has reached maturity it furnishes timber which is moderately strong, coarse-grained, difficult to split, not susceptible to polish, not durable, and liable to warp and check in drying. It is used chiefly in the manufacture of agricultural implements and carriages, and for flooring, cooperage, and saddletrees.

SOIL AND SITE.

The preferable soil for the White Elm is a deep, alluvial loam which is never dry or lacking in abundant plant food. Failing to obtain ideal conditions, the tree adapts itself readily to soils less favorable, or even decidedly poor, and to an adverse climate. It is considered one of the hardiest trees

*Furnished by U. S. Forest Service.

for prairie planting, and is able to endure the great extremes of temperature and drouth of the treeless West. Few trees have been more generally used in prairie planting, and perhaps none is more generally adapted for the exposed and arid planting places of the western plains and prairies.

PROPAGATION.

Reproduction of White Elm is by seeds alone. If propagated for timber it should be done by artificial methods and not left to natural seeding. The rearing of the young plants in nursery beds is usually advisable. Occosionally, when seeds cannot be obtained, or when the nursery crop fails, the seedlings which spring up in damp, open places may be dug and used on the plantation site. One-year-old seedlings can be obtained from dealers at from $3 to $5 per thousand, but it is often economy for the local planter to grow his own stock.

The oval, winged fruit, with the seed inclosed in the center of the papery membrane, is produced in abundance nearly every year. It ripens in May, about the time the leaves appear, and should be gathered and planted at once. Seeds may be obtained from dealers $1 to $1.50 per pound, but it is safer to depend on home-collected material, because, since the vitality of unplanted seeds cannot be preserved more than a few weeks at best, those furnished by dealers are liable to be worthless.

The seeds may be gathered by sweeping them up from the pavements, shaking them down from the trees into a canvas spread out below, or collecting them in eddies or on sand bars where carried by streams. They should never be allowed to become dry from the time they mature until germination is complete. Planting should be done in nursery beds in rich, moist soil, an old garden spot being a desirable site. The seed should be sown in shallow drills in rows 8 to 12 inches apart for hand cultivation and 2 to 3 feet apart if a horse cultivator is to be used. In the rows the seeds should be spaced 1 to 2 inches apart, covered about one-half inch deep, and the surface soil gently firmed down by means of a roller or by pressing with a board. Irrigation should be resorted to in times of drought, since a uniformity of moisture conditions is essential for successful germination of the seed and the most rapid growth of the seedlings. Shade for the young plants is not a necessity, although at times a partial protection from the hot sun or beating rain is beneficial. The seedlings may be transplanted to the permanent site when 1 to 2 years old, at which time they should be 6 to 12 inches high.

To produce the most shapely trees, some of the best nurserymen cut the young trees back to the ground when they are two or three years old from the seed. Vigorous sprouts start from near the wound; the best one is selected for the trunk of the tree, and all other sprouts are kept pruned off. The strong root forces up a tall, straight trunk, which adds to the form and value of the tree.

For prairie planting the White Elm may be set in rows from 4 to 6 feet apart each way. Where a heavy growth of grass exists is should be turned under a year or two before planting, and if possible a crop of cereals grown on the ground. The trees may be set in furrows or in holes dug by a mattock or spade. During the whole transplanting operations the roots should be kept constantly moist, and the dirt packed firmly around the newly-placed seedlings. Cultivation between the rows is advisable until the trees are large enough to shade the ground underneath. In the East the preliminary breaking of the ground is not so essential, although the young trees should not be allowed to become overtopped by weeds or grass.

White Elm may be grown in pure stands, or in mixtures with various rapid-growing, light-needing species, or with slow-growing trees if they are planted first and allowed to attain a height of 5 to 6 feet before setting the elm. Good associate species are the

Hardy Catalpa, ashes, locusts, coffee-tree, black walnut, black cherry, red cedar, and European larch.

ENEMIES.

Although seldom injured by wind, snow, or fungi, the White Elm is seriously affected by numerous insects. Borer larvæ channel the inner bark and the surface of the wood so frequently as to kill the tree; but by far the greatest damage is done by the elmleaf-beetles, and other leaf destroyers. In parts of the country park and street trees have been killed, and planting of the elm has been discontinued on this account. It is possible, however, by early and thorough spraying to protect the trees and in the end to bring about the reduction or extermination of the leaf-destroying insects. In case of extended ravages, specimens of the insect, together with a full account of the character of the injury done, should be sent to the Division of Entomology of the Department of Agriculture, in order that the insect may be identified and measures suggested for its destruction or control.

POSSIBILITIES AND USES.

Stately and graceful in form and outline, and rapid growing and hardy in varied soils and severe climates, the White Elm adapts itself to the needs of most tree planters, and is grown extensively throughout its broad range. As a shade or park tree it has few equals, and throughout the East is considered the ideal tree for ornamental planting. It does not thrive in cities where coft coal is habitually used, nor along streets where the moisture is all carried off by artificial drainage. On the borders of gardens or cultivated land it is objectionable because of the extensive spreading of the surface roots. For Western planting it has a recognized place in forest plantations which it well deserves.

BEAUTIFYING THE STEEL HIGHWAY*

Splendid Achievements of the Boston and Maine in Railroad Forestry and Horticulture

BY

F. WILLIAM RANE
Director, New Hampshire College.

EVERYTHING that tends to make the world more beautiful, especially when the usefulness of such beauty can be appreciated and enjoyed by the greater masses, deserves commendation and appreciative acknowledgement.

In a quiet and persistent way our railroads are beginning to do what the writer predicts will eventually mean more to the nation's pride at home and its prestige abroad than some of our other efforts upon which we at present set greater value.

There is just as much reason why public sentiment should be interested in improving our great commercial highways as there is that our local and inter-urban roads be made better.

Every community gains its reputation in proportion to the interest its citizens take in its welfare. The old adage "A good reputation gets abroad that begins at home" is as true to-day as it ever was.

More has been done by American railroads to beautify the right of way, and particularly the stations and their

*Text and illustrations reprinted through courtesy of the Boston & Maine *Messenger*.

surroundings, than most people realize. Up to a comparatively recent period even the decoration of our homes has been quite largely neglected in the United States, and many of our people, while making large expenditures for paintings and other works of art, have allowed the very important feature of landscape gardening to go by default. There has even been a notable lack of harmony between architecture and landscape gardening in this country.

Happily, this condition has already undergone a vast change, and the American people are rapidly becoming better balanced in this respect.

Our railroads, or at any rate the larger systems, are taking an advanced stand with reference to the question of landscape effects and embellishments. Many roads take great pride in the effective planting of flowers and shrubs around station buildings, as well as in adopting modern architecture for these buildings, especially where they have reason to know that their patrons appreciate such efforts.

The far-sighted railroad manager having the best interests of his corporation at heart, understands that a wise expenditure of money for landscape gardening and tree planting along his line is one of the very best investments for the present and the future that can be made, because of the effect it has in securing the co-operation and good will of the public.

To take as an illustration the Boston & Maine Railroad: This road traverses some of the most interesting and attractive country under the canopy. It not only furnishes the best of transportation facilities for business men, wage earners, tourists and "summer boarders," but practically provides the life blood of industrial northern New England.

Students digging White Pine Seedlings for transplanting.

Not only has this progressive corporation set the pace in the matter of beautifying station grounds and thus helping to make communities more attractive, but it has done much to forward the interests of scientific forestry in New England.

It is a matter of gratification that more work of a practical nature is being attempted toward a solution of the forestry problem to-day than ever before. The writer is connected with

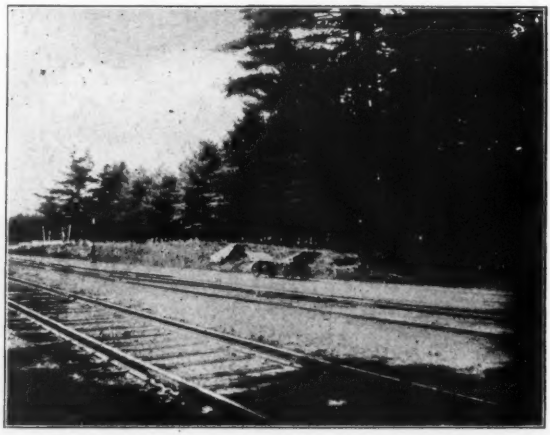
one of the New England colleges and has participated in the work of furthering a rational system of forestry for this section. In this work the co-operation of the Boston & Maine Railroad has been of decided value. Its representatives have attended the meetings of the Society for Protection of New Hampshire Forests and similar bodies, and on occasion of the Forest Congress in Washington last winter it was represented by a special delegate.

Through the courtesy of the officials, the writer has been enabled to become acquainted with a number of the men immediately in charge of the carrying out of the landscape improvement work of the road.

Among those with whom he has talked and exchanged ideas is Mr. Lowville Curtis, general roadmaster of the Western Division, who has been in the employ of the company for a number of years and is not only an excellent engineer, but has a marked taste for all horticultural and forestry pursuits.

Four or five years ago scarcely anything important was being done in the way of embellishing the grounds about depots. The custom of allowing each station agent ten dollars' worth of tender bedding plants for the decoration and improvement of his station had, however, long been practiced by the company.

The practice of awarding prizes for effective plantings in the immediate vicinity of station buildings had greatly encouraged the agents in the work; but while for a short time during the latter part of the summer the effect of these efforts was pleasing, it did not satisfy Mr. Curtis, and he began in a quiet way to direct the efforts of his men toward a more permanent reward for their labors.



Rockingham Junction, N. H.—A sample of Modern Forestry.

He began to advocate the use of perennial shrubs and vines. An interesting incident occurred about this time. Mr. Curtis learned that one of his laborers had worked in a nursery in the old country. Upon questioning him as to the proper way to propagate hydrangeas, the laborer replied in such fluency of scientific terms that Mr. Curtis at once directed his energies into the landscape gardening department.

According as he could be spared, the man took cuttings, collected seeds and plants and propagated and

brought together as many shrubs and plants as could be obtained.

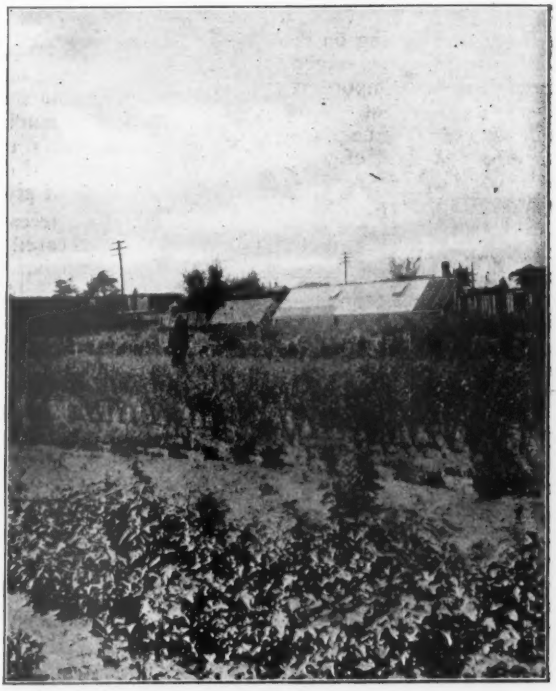
In a short time, a small progagating house was constructed, in order to enable the men to continue the work during rainy days and in winter. While this house is comparatively small and inexpensive, it nevertheless stands for a large amount of work accomplished.

The greenhouse was constructed at one end of the warehouse and supply yards of the Western Division at South Lawrence, Mass., where Mr. Curtis has his headquarters. One is struck with the happy manner in which the æsthetic is blended with the practical here—a department of shrubs for embellishing right of way merging into piles of rails, ties, switches and movable railroad property of all kinds.

Although the work was started less than five years ago, it has grown so rapidly that practically all the available space in the immediate neighborhood of the office and yards is utilized for nursery purposes. Thousands of shrubs are being distributed all along the line of the Western Division and many are sent to other divisions, and yet the propagating area increases.

The nursery being located where the workmen naturally congregate prior to setting forth upon their various duties along the line, gives an opportunity to utilize the spare hours of these men, which in the aggregate means a great deal of time.

Nearly every arriving train brings one or more men from a completed job of some kind, and instead of "killing time" waiting for the next train, he spends his leisure to advantage hoe-



General View of the Boston & Maine Nursery at South Lawrence.

ing, digging, transplanting or performing some sort of nursery work. The men greatly enjoy the novelty of the labor too.

Often a large gang of men finishes work a few hours before quitting-time, and rather than start in on a new piece of work in which they could hardly make a beginning, this time is spent in the nursery. It surely has proven a great success, and a study of its workings would well repay any railroad corporation.

In forestry the work is going on in a simewhat similar way. Danger from forest fires is a most important factor in railroad management. The Boston & Maine road follows the practice of burning over the right of way by its section men and at once removing all inflammable substances.

To a certain extent, during a dry time, a system of patrol is carried out. Some of the accompanying illustrations show examples of forestry practices as carried out by the Boston & Maine. This road has purchased a number of small tracts adjoining the right of way and is encouraging the adoption of modern methods of forestry in developing these holdings. As with the work with shrubs, that in forestry is just beginning.

In one of the small groves eighty cords of wood were cut in thinning, and the growth remaining is far better for it. Mr. Curtis finds that in the quieter times of the year, it is possible to relieve a man here and there on a section for a day or so and have him report for duty on some of these wooded tracts, where his work is accomplished at no extra expense to the company. The company always finds ready use for all forest products.

The beautiful shady groves, such as those at Rockingham Junction, N. H., or Lowell Junction, Mass., are not only valuable forest properties of the railroad, but are more desirable and effective than any other possible sort of planting. To be able to while away one's time in summer at stations like these is a veritable pleasure.

Trees and shrubs certainly can be made to minister greatly to the comfort and pleasure of the traveling public.

The Boston & Maine planted two barrels of seed chestnuts along the Western Division in 1904. It has also started a large number of white pine seedlings in frames, and a few years ago Mr. Curtis imported a number of catalpa trees which he is experimenting with to determine their value in New England.

The time is not far distant when railroads generally will have their own nurseries, and when the embellishment of station surroundings, the covering up of unsightly embarkments, etc., will be a matter of duty to them, as well as a source of pride.

More and more trees and groves will be planted and cared for, not only for their shade and beauty, but as a part of the railroad's economy in supplying ties, telegraph poles, piles, fuel, etc.

Were railroads to employ experts to formulate forestry plans, the small expenditure would yield abundant returns. Such an official could extend his influence by co-operating with the superintendents of parks and with city and town authorities in his district. In farming and wooded sections similar co-operation could be carried out with resulting better crops of fruits, vegetables and general farm produce and a corresponding improvement in forestry methods.

Assistance in this work undoubtedly could be had from the men engaged in teaching these branches at the various agricultural colleges and from the United States Department of Agriculture.

The work of beautifying and making our beloved country one that we can feel proud of at home or abroad is not only one in which governments and corporations, but public-spirited men, women and children everywhere should take great pleasure.

PROFITS FROM FOREST RESERVES TO BE SHARED BY COUNTIES

Ten per cent of Gross Receipts Alloted by Law to Offset Loss in Taxes—Nearly Seventy-Seven Thousand Dollars this Year

WITHIN the last two years the area set aside for forest-reserve purposes has increased from less than 50,000,000 to more than 100,000,000 acres. Such a change caused great consternation among those who were not familiar with the objects to be attained by forest reserves. All the enemies of the National forest policy made ammunition of it, and many of its more timid friends began to fear that the movement was going too far. Most of the arguments of doubters, however, could easily be refuted.

There were two objections that could not be disposed of so readily—first, that this vast area, as large as all the New England and Middle States with Maryland and Virginia thrown in, took away from opportunity for agricultural settlement and home building many tracts of land scattered here and there along the creeks and valleys within the forest reserves. The Forester felt the propriety of this criticism keenly and studied carefully the boundaries of each reserve to eliminate as much agricultural land as possible. Finding that many small tracts remained, he submitted to the Secretary of Agriculture the "Agricultural Settlement Bill," which the latter recommended to Congress and which finally received the President's signature June 11, 1906.

Although under this law all land actually usable for home building will be brought within the reach of the people, there was another strong objection to the reserves, namely, that many counties in which reserves lie have much, in some instances more than half, of their area withdrawn from the possibility of private ownership and taxation. The Forest Service was not unmindful of the unfairness of this condition and submitted a bill to grant 10 per cent. of the total receipts from forest-reserves to the counties in which they are situated. This proposed law was finally incorporated in the forest-reserve provisions of the agricultural appropriation act of June 30, 1906. The clause reads as follows:

"That ten per centum of all money received from each forest reserve during any fiscal year, including the year ending June thirtieth, nineteen hundred and six, shall be paid at the end thereof by the Secretary of the Treasury to the State or Territory in which said reserves is situated, to be expended as the State or Territorial legislature may prescribe for the benefit of the public schools and public roads of the county or counties in which the forest reserve is situated: *Provided,* That when any forest reserve is in more than one State or Territory or county the distributive share to each from the proceeds of said reserve shall be proportional to its area therein: *And provided further,* That there shall not be paid to any State or Territory for any county an amount equal to more than forty per centum of the total income of such county from all other sources."

The proceeds from forest reserves in the fiscal year ended June 30, 1904, were $58,436.19. During the next fiscal year the receipts were $73,276.15. The transfer of the forest reserves to the Forest Service was made February 1 of that year, and during the five months remaining the Forest Service was busy reorganizing the plans for forest-reserve administration. The result is notable. During the year ended June 30 last the receipts were $767,219.96, which was more than a tenfold increase over the previous year.

The full measure of the importance

of this 10 per cent. provision can not, however, be taken from the figures of this year. The receipts from the reserves will probably increase with great strides for years to come, and the contribution to the counties is destined to make up richly for the loss of taxation.

The 10 per cent. contributed to the counties is safeguarded in the act by a provision that it must be spent entirely for the maintenance of schools and public roads. The State legislatures are allowed to direct the expenditure. Another safeguard is that the contributions from forest-reserve receipts must not in any case be greater than 40 per cent. of the taxes received from other sources.

The governors of all the States and Territories in which forest reserves are situated have been informed by letter concering the amount which will come to each State at the present time from the forest-reserve proceeds of the last fiscal year. These letters say:

"* * * The payment of the 10 per centum thus provided will be made by the Secretary of the Treasury, who will determine the exact distributive share of (name of State). Pending this determination the following reports from the records of the Forest Service will show you the gross receipts from the forest reserves in your State during the fiscal year just closed and the approximate (but perhaps not the exact) amount which you will receive under the terms of the act just quoted. * * *

"It is with very great pleasure that I am able to notify you of this beginning of the direct contribution of the forest reserves to the counties in which they lie. * * * The proceeds from the reserves are likely to increase rapidly, so that this contribution, although it may not yet have reached an important figure, will ultimately pay a very considerable proportion of the expenses of the counties which are fortunate enough to have forest reserves within their boundaries. * * *"

The sum which each State and Territory will receive this year is given below:

States.	10 per cent.
Arizona	$7,976.68
California	8,192.12
Colorado	12,541.79
Idaho	6,436.24
Kansas	102.00
Montana	5,869.04
Nevada	24.00
Nebraska	790.35
New Mexico	4,694.55
Oklahoma	120.95
Oregon	7,587.36
South Dakota	3,599.05
Utah	9,786.86
Washington	1,936.43
Wyoming	6,781.50
Alaska	283.00
Total	$76,721.92

Alaska, being neither a State nor a Territory, is not entitled by the wording of the law to share in the distribution.

NOTES ON THE FORESTS OF HARFORD COUNTY, MARYLAND

BY

TREADWELL CLEVELAND, JR.
U. S. Forest Service.

THE soil and topography of Harford County are generally favorable to forest growth. As a whole the county is well forested; considerably over half its total area is clothed with forests of which a good proportion will supply mechantable timber. More than common economy has been shown in clearing. One rarely sees non-agricultural land, steep slopes, or hilltops denuded. On the contrary, it is striking that most of the farms are well supplied with woodlots, especially where rough or steep land would make agriculture only a temporary or partial success. Virgin timber, of course, is not to be found in important quantity, but the second growth, especially the coppice chestnut and oak, is chiefly vigorous and sufficient in quantity to supply demands for home consumption almost indefinitely. In the southern lowlands bordering the Chesapeake the heaviest stands of large timber are found. These have only recently been severely cut. Five or six years ago cutting began to take some of the best of this timber, largely for use outside the county. At the present time one of the best stands in Gunpowder Neck is being removed by a manufacturer in Kent County, who veneers red gum for fruit baskets.

The soil varies from a sandy loam and sandy clay toward the south along the Chesapeake to a loam in the interior of the county about Belair and a much rougher, stonier loam in the nothern part toward the Pennsylvania boundary. Coupled with the rise in elevation from the Chesapeake inland this change in the character of the soil controls the distribution of botanical species. On the level southern lowlands, for instance, the abundance of red gum in all stages of growth and particularly its spreading and vigorous reproduction are characteristic. With the red gum occur yellow poplar, white oak, red oak, Spanish oak, willow oak, and ash. Locust, an abundant tree throughout the county, and juniper are also found here growing to large dimensions. Several exceptionally large groups of juniper were noted. On leaving the shore and gaining a higher elevation and a different soil the frequency of red gum diminishes, while swamp, Spanish and willow oak practically disappear, scrub oak, chestnut oak, and chestnut increase in abundance and size, and sassafras also is found in larger quantity. The characteristic forest of this upland section of the county is chestnut and chestnut oak coppice. Another change from the snore line to the hills is the occurrence on the higher elevations of several species of natural and planted conifers. White pine, pitch pine, scrub pine and short-leaf pine were found. On the farms planted Norway spruce and silver fir and European larch had attained good size.

The abundance of locust merits special consideration in the county. Wherever good light reaches seedlings or saplings, as for example along fields and on the borders of the woodlot or forest glade, locusts are found in good numbers. Especially along roadside fences locust have secured a footing, apparently by the well-known means of the wind blowing winter-shed seeds over the fields and lodging them in drifts or against such obstacles as fences or underbrush. A good deal of planted locust is also found, but this,

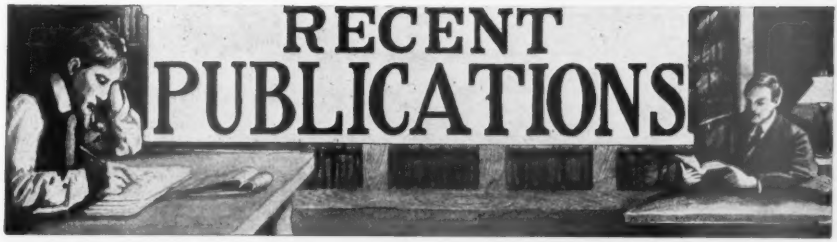
of course, has but slight commercial importance in comparison with the natural groves and fence rows. The conditions of soil and climate seem particularly favorable to the healthy growth of locust practically throughout the county.

It is quite plain that farmers very well appreciate the serviceability of locust. It is a conspicuous tree about the farmstead, and evidently much prized for its beauty, shade, and supply of honey-producing flowers in early spring, but its main value is well understood to be its use for fence posts. The farms of the county, as a whole, are particuarly well fenced. Although chestnut is the most common wood for these fences, locust is apparently much used for this purpose. There could be no doubt about its furnishing, on the whole, as serviceable fence material as any that could be had. In view of the natural vigor of locust of this region and of its unusual utility, there can be little doubt that a real investment might be made by planting the less fertile or more rugged parts of farms with this tree. Red gum is certainly one of the important trees of the county. Not only is it found in good dimensions throughout the lower, moister lands of the southeastern part of the county, but there seems also to be a growing tendency toward seeding up a good deal of cutover or cleared lands with this tree. There can be little doubt, therefore, that in this part of the county red gum is destined to compete favorably with more important species, and eventually to assume a larger importance in the forest than it now enjoys. In view of the increasing use of red gum, since proper methods of handling it and drying are able now to cure its former defects, the red gum of Harford County has so much the more commercial importance.

Whole fields lying to the leeward side of the forest are occasionally seen growing up almost solid to juniper. The ability of this tree to withstand drought and intense light through all stages of its growth especially when very young, coupled with other favoring circumstances of soil and climate, have resulted in giving this tree a wide, important distribution in the county. How favoring conditions in general are for the growth of juniper may be seen especially in the very fine individual specimens which are a striking feature along road sides and lanes and bordering division fences. Since juniper furnishes probably the best fence posts obtainable, it is clear enough that a good deal of money value is represented in the hundreds of thousands of juniper posts now ripe for cutting or growing rapidly toward usable size.

Among the encouraging conditions for marketing forest products in the county are the unusually good roads which make transportation to the railways or to the waters of the Chesapeake easy and inexpensive. Though toward the northwestern part of the county the roads are so steep that much washing occurs, still the larger part of the county enjoys macadam roads of excellent quality. Up-to-date road-making engines are busy improving the poorer roads.

It would probably be a serious mistake to count on supplying demands for timber outside the county, but the changes in forest type from north to south give good opportunity to make exchange of one kind of timber for another, and it is always economical to be able to reach the sawmill without extra transportation expenses.



Appalachia—May, 1906. Published by the Appalachian Mountain Club. Pp. 196, illustrated. Boston, 1906.

The current number of Appalachia contains, in addition to the articles and club papers regularly issued, the reports of officers, proceedings of meetings, and official reports of the Appalachian Mountain Club for 1905. Among the contributed articles there is a very interesting paper on "The Proposed Eastern Forest Reserves," being compiled from an address delivered before the club by Mr. Gifford Pinchot, on January 20, 1906. In the reports of the councillors, Mr. Harlan P. Kelsey contributes a gratifying statement of the forestry work accomplished by the club and urges the perpetuation of New England forests. The pamphlet contains some very striking mountain views, particularly those illustrating Miss Annie S. Peck's article on climbing Mount Sorata.

Fourth Annual Bulletin of the Connecticut Forestry Association. Pp. 16, illustrated. New Haven, 1906.

This pamphlet contains a short concise statement of the progress in forestry in Connecticut and the need for its more general practice—in general a complete exposition of the forest situation in Connecticut. Mr. Austin F. Hawes, State Forester, contributes the leading article on the "Forestry Situation in Connecticut." In addition, the Connecticut laws bearing on forestry are appended, and the Conecticut Forestry Association, its aims and work, briefly described.

Proceedings of the Iowa Park and Forestry Association, Fifth Annual Meeting. Published by the Association. Pp. 133, illustrated. Des Moines, 1906.

This volume contains the complete proceedings of the meeting of the Iowa Park and Forestry Association held at Des Moines, December 11 and 12, 1905. Discussion of forestry occupies a gratifying amount of space, and includes an excellent paper by Mr. H. P. Baker on "How to Plant a Ten-Acre Lot to Trees," from the viewpoint of the Forest Service, and a contribution of value on the same subject from another viewpoint by Mr. B. Shimek.

Bulletin of the New York Botanical Garden. Vol. 4, No. 13, issued June 25, 1906. Pp. 308, illustrated. New York, 1906.

The volume here presented contains five papers by eminent authorities, describing contributions to flora of various localities, and descriptions of new species collected. To the botanist and student of native flora the book should prove valuable.

Irrigation in the North Atlantic States. Office of Experiment Stations, Department of Agriculture, Bulletin No. 167. By Aug. J. Bowie. Pp. 50, illustrated. Washington. Government Printing Office. 1906.

The bulletin presented here includes the results of investigations made in 1905 in Maryland, Delaware, Pennsylvania, New Jersey, New York, Rhode Island and Massachusetts to determine to what extent irrigation was practiced, and the various methods in vogue. The report shows conclusively that for market gardens and meadows, irrigation in humid sections has proven profitable. As yet its application in the raising of general farm crops has not been extensive. The cost of water, notwithstanding its abundance in the East, far exceeds that in the arid regions, and the suggestion is made that if this cost could be reduced, the application of irrigation would render the production of many crops profitable, which, with the present cost of water, are unprofitable. The descriptions of irrigation practice should be suggestive to many who are now raising truck without the aid of irrigation.

Topographic Development of the Klamath Mountains. Bulletin No. 196, U. S. Geological Survey. By J. S. Diller. Pp. 66, illustrated. Washington, Government Printing Office.

As its title indicates this bulletin contains an exhaustive analysis of the topographic features of those portions of Northern California and Oregon embraced in the Klamath range.

DEPARTMENT OF THE INTERIOR, Washington, D. C., July 3, 1906. Sealed proposals will be received at the office of the Engineer, U. S. Reclamation Service, Billings, Montana, until 2 o'clock p. m., August 23, 1906, for the construction of structures on Division 1, Garland Canal, Shoshone Project, Wyoming, involving about 18,000 cubic yards of grading, 1,800 cubic yards of concrete, the placing of 127,000 pounds of steel reinforcing bars and other incidental work. Particulars may be obtained from the Chief Engineer of the Reclamation Service, United States Geological Survey, Washington, D. C., or from the Engineer, Cody, Wyoming. THOS. RYAN, Acting Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., July 3, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Williston, North Dakota, until 10 o'clock, a. m., August 30, 1906, for the construction of canals and ditches, involving the excavation of about 220,000 cubic yards of earth and furnishing labor and material for various structures requiring about 40,000 feet B. M. of lumber, and 1,000 cubic yards of concrete, in connection with the Williston Project. Particulars may be obtained from the Chief Engineer, United States Reclamation Service, Washington, D. C., or from H. A Storrs, Electrical Engineer, Williston, North Dakota. THOS. RYAN, Acting Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., June 11, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Salt Lake City, Utah, until 3 o'clock p. m., August 30, 1906, for the construction of the Strawberry Tunnel, involving 18,600 linear feet, more or less, of tunnel, the same being a portion of a system for the diversion of about 500 cubic feet of water per second from Strawberry River to the Spanish Fork Valley, Utah. Particulars may be obtained from the Chief Engineer of the Reclamation Service, Washington, D. C., or the Engineer, Salt Lake City, Utah. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., May 29, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Browning, Mont., until 2 o'clock p. m., July 31, 1906, for the construction of about 14 miles of canal for the diversion of 850 cubic feet of water per second from the St. Mary River at a point about 35 miles northwest of Browning, involving the excavation of about 1,700,000 cubic yards of material. Particulars may be obtained at the office of the Chief Engineer of the Reclamation Service, Washington, D. C., or from Cyrus C. Babb, Engineer, Browning, Mont. E. A. HITCHCOCK, Secretary.

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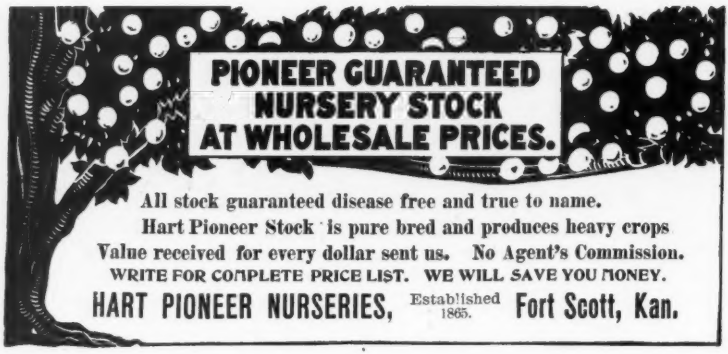

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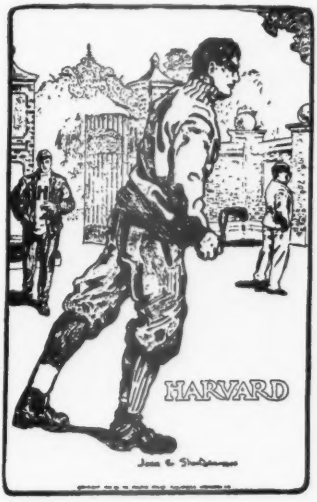

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3. The construction by the Federal Government of storage reservoirs and irrigation works wherever necessary to furnish water for the reclamation and settlement of the arid public lands.

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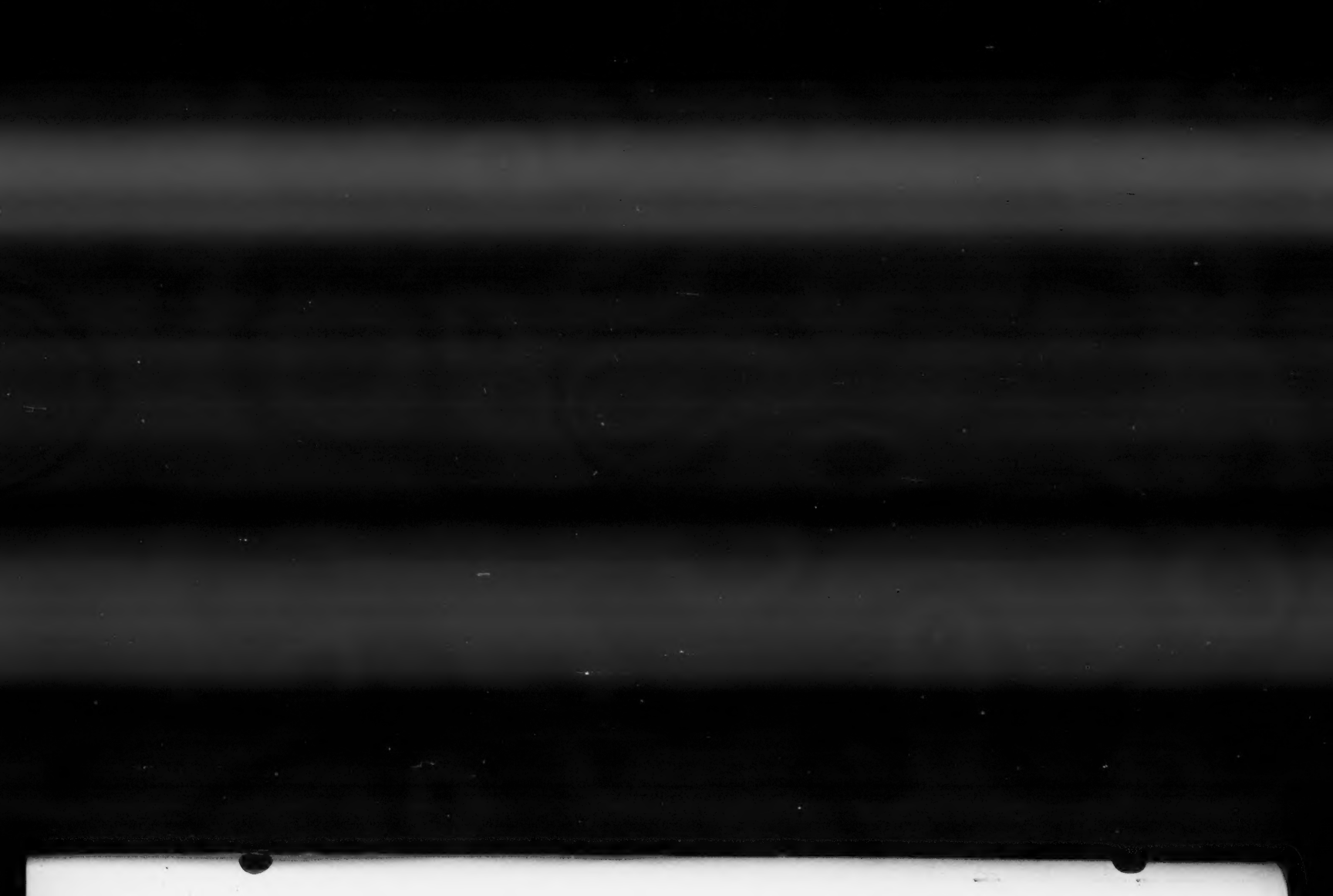

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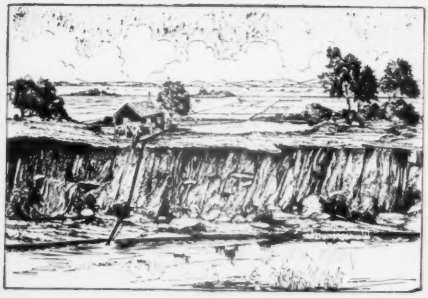

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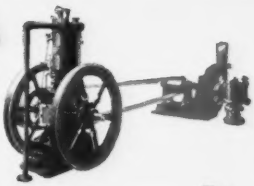

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